PRACTICAL

SPECIFICATIONS OF WORKS

EXECUTED IN

ARCHITECTURE, CIVIL AND MECHANICAL ENGINEERING,

AND IN

ROADMAKING AND SEWERING;

TO WHICH ARE ADDED

A SERIES OF PRACTICALLY USEFUL AGREEMENTS AND REPORTS.

Illustrated with Numerous Plates.

By JOHN BLENKARN,

CIVIL ENGINEER AND ARCHITECT.



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TO

CHARLES GILPIN, ESQ., M.P.

Sir,

I regard your kind permission to dedicate this my second literary effort to you both a pleasure and privilege, and it affords me the opportunity of acknowledging many acts of kindness received at your hands.

Your encouragement of whatever is conducive to general utility, gives me hope that, however humble are the merits of this work, you will approve my desire to add my quota to the stock of knowledge available to the public on the important *practical* business of the Engineer and Architect.

I have the honour to be, Sir,

Your most obedient servant,

JOHN BLENKARN.

Blackheath, S.E., May, 1865.

PREFACE.

Specifications, agreements, forms of contract, bills of quantities, and reports, are not of a nature to attract the student in architecture, for they contain, in a dull, dry, and methodical form, the details and requirements of the sordid, the money-making, and the practical business of the profession, and they are by no means so inviting as the invention of pretty elevations and perspectives of buildings never to be executed, which form so important a part of the stock in trade of the young architect.

The student must be reminded, however, that the neglect of these practical details may not only prove embarrassing to him in his future career, in his intercourse with other professional men who have acquired a proficiency in these most important matters, but will, to a great extent, render him dependent on the advice of others much his inferior in point of education, and what may be termed the higher acquirements of the profession. It has been said, as the highest praise of Sir John Soane, that he rarely exceeded his estimates, and, to the greatest censure of other eminent men, that their estimates could never be depended on. The idea is all but universal that architects are unable to estimate the exact cost of a building, and other persons are

largely and profitably employed to make out bills of quantities and estimates from the architect's drawings, a section of business which undoubtedly belongs to the architect, and which he ought to be best able to perform.

If the writer had consulted his own pleasure and convenience, either he would not have written at all, or on a subject more congenial to his taste; but, from long and constant practice, he has witnessed so much ignorance and inaptitude on the part of young men in these particulars studying for the profession, and, indeed, after their studies should have been concluded, and fitted them for useful assistants, that, with the advice of his publishers, he has selected in the form now presented a series of specifications, forms of contract, agreements, bills of quantities, schedules of prices, and reports, all bearing on practical subjects and of works executed, not intended to apply to very extensive undertakings or to works of any special character, but to such as are likely to come within the scope of general practice particularly of the young architect and surveyor, and in choosing this path the writer is not aware that he has trespassed on preoccupied ground, either as to the expense of the book or the questions treated of in it. An attempt has been made to introduce a variety of subjects, and as these are classified under the divisions given in the Index, a more detailed account seemed scarcely necessary in a work of such limited extent.

At one time it was the intention not to have given any plates, but, on consideration, this intention was abandoned; however, they are merely such as are sufficient to illustrate the text, and render the specifications more applicable; at the same time, the estimates have been

given, by which all may see what has been done with the money.

The contracts and agreements may be considered as rather occurring within the province of the lawyer than the engineer, and would, consequently, have been omitted but for the opinion the author entertains that mathematics and law should form branches of study of the engineer and architect, and that that man is ill qualified to enforce the fulfilment of contracts who is ignorant of the circumstances by which they may be effected, and the means by which they may be broken and evaded. An eminent lawyer observed to him, on one occasion, that the best and safest lawyer to consult in reference to contracts was the architect or engineer himself, for, at last, all the vital and important questions would have to be referred to him.

Blackheath, S.E., 1865.

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PRACTICAL
SPECIFICATIONS OF WORKS.

SECTION I.—SURVEYING.

ROADS, FENCES, STREETS, AND SEWERS.

I.—*Contract and Specification for the formation and completion of a* New Road *at S——, Middlesex.*

This Indenture, made the day of , , between of , of the one part, and of of the other part.

Whereas the said hath proposed to prepare and complete certain roads and paths, drains and gullies, and also erect, build, and complete a certain bridge in and upon the Farm, in the parish of E——, in the County of Middlesex, agreeably to the plans and sections hereto annexed, and marked A, and to the specification in the schedule hereunder written, and in all respects to the satisfaction of the engineer of the said , at or for the sum of , which proposal he, the said

, has accepted, and for the due carrying out of the said proposal and contract, it has been agreed that , of , in the county of , and , of the county of , shall execute a bond, bearing even date herewith to the said , to secure the due performance of the said contract by the said , and that the said and should enter into these presents.

Now this indenture witnesseth, that in consideration of the covenants on the part of the said hereinafter contained, the said doth hereby for himself, his executors, and administrators, covenant with the said , his executors, administrators, and assigns, in manner following, that is to say: that he, the said , his executors, or administrators, will, on or before the , now next ensuing, make, do, perform, execute, and complete, or cause to be made, done, performed, and completed, all and singular the works mentioned in the schedule hereunder written, and according to the plans and sections hereto annexed; the same works to be done, performed, and completed in a good, efficient, and workmanlike manner, and to the satisfaction in all respects of ; and also will, at his own costs and charges, find and provide, execute and perform, all bricks, stone, and other materials, tools, instruments, and utensils (the bricks, stones, and other materials to be of the kind and quality specified in the said schedule, and to be approved of by the said), and all manner of labour and workmanship that shall be necessary or proper for the excavation and preparation of the ground, the cartage and removal of the said soil and earth; the formation, construction, and erection of the said bridge; and the various roads, paths, drains,

and gullies, as in the said schedule, plans, and specifications specified; and generally for the performance and completion of all and singular the works mentioned and specified in the said schedule hereunder written; and also that if any of the bricks, stone, or other materials so made use of by the said , his executors or administrators, in or about the said works, be found defective by the said , and in every such case he, the said , his executors or administrators, will forthwith, at his and their own costs and charges, remove all such defective bricks, stone, or other materials, and replace the same by other good and sufficient bricks, stone, or other materials, to the satisfaction of the said ; and also that if any part of the said works be found defective by the said last above mentioned in point of workmanship, as by a bad disposition of the materials or otherwise, then, and in such case he, the said , his executors or administrators, shall forthwith, at his and their own costs and charges, remove all such defective work, and replace the same in a manner satisfactory to the said ; and also that if the , his executors or administrators, shall in any manner neglect or delay the progress and completion of the said works, and the said shall give or leave notice in writing of such neglect or delay at the place of abode of the said , his executors or administrators, and the said , his executors or administrators, shall not proceed with the said works within the space of seven days after such notice given or left as aforesaid, then in such case it shall be lawful for the said , his executors, administrators, or assigns, to take and complete the said works at his or their own expense with the same or other workmen,

materials, and utensils (the expense of such last-mentioned completion to be deducted from or set off against all moneys then due to the said , his executors and administrators, under this indenture, or to be recoverable against the said , under this covenant, or against the said sureties as aforesaid), and without molestation in any way upon the part of the said , his executors or administrators; and also that by default of the said , his executors or administrators, the said works be not completed by the said first day of June now next ensuing, then and in such case the said , his executors or administrators, will forfeit and pay to the said , his executors, administrators, and assigns, the sum of 7*l.* by the week for each and every week that shall be taken up in completion of the said works after the said first day of June now next ensuing, such forfeiture to be by way of debts and liquidated damages, and not by way of penalty, and to be deducted from or set off against all moneys then due to the said , his executors or administrators, under this indenture, or to be recoverable against the said , his executors or administrators under this covenant, or against the said sureties as aforesaid.

And the said doth hereby further covenant and agree to, and with the said , his executors, administrators, and assigns, that if any defect, failure, or omission shall, within the space of six months after the completion of the works hereby covenanted to be performed, be found in any portion of the said works by the said , then that the said , his executors or administrators, shall and will forthwith make good, repair,

and amend such defect or omission, to the satisfaction of the said , and that in case of his neglecting so to do, then it shall be lawful for the said , his executors or administrators, to make good and repair the same, the expenses of such repair and making good to be deducted from or set off against all moneys then coming to the said , his executors or administrators, under this indenture, or to be recoverable against the said under this covenant, or against the said , sureties as aforesaid.

And the said , in consideration of the premises hereby for himself, his executors, and administrators, covenants with the said , his executors and administrators, that he, the said , his executors and administrators, will pay to the said his executors and administrators, the sum of , of lawful British money, and such further sum, if any, as may be due for extra work as hereinafter mentioned in the manner following, that is to say, that he, the said , his administrators, executors, or assigns, will fortnightly, on every second Friday after the first Friday from the commencement of the said works, pay to the said , his executors or administrators, the sum of 75*l.* for every 100*l.* worth of work done and complete up to every Monday preceding such second Friday, upon receiving a certificate signed by the said , that such amount of work has been completed.

Provided always that the said , his executors, administrators, or assigns, shall not in any case be called upon to pay more than the sum of 300*l.* per month on account of such per-centage, and will pay the remaining 25*l.* per cent. of the work done, or other

the balance remaining due, at the completion of the said works as follows (that is to say): 17*l.* 10s. per cent. of such 25*l.* per cent. within one month after such completion, and the remaining 7*l.* 10s. per cent. on the expiration of six calendar months next after all the works in the schedule hereunder written shall have been finished and completed to the satisfaction of the said , the same to be testified in writing under his hands, subject always to such deduction, set-off claim, or forfeiture as aforesaid.

And it is hereby further agreed and declared by and between the parties hereto, that if in the progress of the said works the said , his executors, administrators, and assigns, shall in writing direct other work to be done by the said , his executors or administrators, than mentioned or specified in the schedule hereunder written, and in such case the said , his executors, administrators, or assigns, shall and will pay to the said , his executors or administrators, for such extra work such further sum as having regard to the said hereinbefore mentioned contract price of the said may deem reasonable and fitting.

And it is hereby further agreed and declared by and between the parties hereto, that all bricks, stone, and other materials brought on the said Farm or prepared there by the said , his executors or administrators, in pursuance of this contract, and approved by the said , shall, from the period of such approbation, absolutely vest in and become the property of the said , his executors, administrators, or assigns.

Provided always that in all questions or differences that may arise between the said parties hereto, or their representatives, in the progress of the said works, con-

cerning the management, value, admeasurement, or quality of work (including extra work and reparations or materials, or the fitness or quality of workmanship, or the times of completion of the works, or any part thereof, or the neglect or default on the part of the said , his executors, or administrators), the decision of the said shall be final and conclusive.

In witness, &c.

Schedule above referred to.

ROAD FOOTPATHS AND EARTHWORK.

To remove the present turf or surface of the road six inches in depth and sixty feet wide, applying the turf or surface so removed to the formation of the footpaths and embankments at the bridge hereinafter mentioned, and for making up the irregularities and inequalities on the surface of the road; also to remove, to the depth of six inches more, the soil at the side of the footpath or water-table, running the same out gradually to the formation surface in the centre of the road, and in accordance with the curve shown in the transverse section of the road, and to apply the soil so removed to form the footpaths and embankments at the bridge.

At the places where the road crosses any of the open ditches, to lay down *nine-inch* tubular socket metallic earthenware glazed pipes, such pipes to be of the best manufacture and provided by the contractor. Under the footpaths, as shown on plan, lay in similar pipes to carry the water from the water-tables into the brook at a proper inclination to prevent the washing away of the embankments.

To form the embankments at the bridge according to the sections and plans in the accompanying drawing.

To form and lay out the footpaths; the same to be

raised, as shown on transverse section, above the water-tables, and gradually sloping thereto on the finished surface.

To finish the edges of the footpaths with a turf border eight to ten inches wide. The sides of the footpaths to be drawn to the true curve of the road, and pared and packed perfectly square and smooth on the finished surface.

To cut away any of the fences where directed, for making bavins therewith, laying the same down upon the formation of the road where it is *soft*, and over the embankments, in such a manner that they shall measure full seven inches in thickness when covered with ballast.

To provide, cart, shoot, and spread good gravel *screenings* over the whole surface of the footpaths, the same to be subsequently raked level and then rolled smooth on the surface with a heavy roller, and to be laid down of such a depth and thickness as that there shall be an uniform thickness or depth of eight inches of gravel after the same shall have been levelled and rolled.

To provide, cart, shoot, and spread over the surface of the road good well-screened gravel or ballast (not applying any gravel or stones that will pass through a sieve or riddle of one inch gauge), the same to be raked level and rolled in the same manner, and to be of a similar depth, as provided for in respect to the footpaths, and in addition, after the gravel shall have been well rolled and settled, provide, cart, tip, and spread along the middle of the road, and for the whole length thereof, and for the full width of *thirty* feet, a further layer of three inches in thickness of such finer gauged gravel as the said engineer shall direct.

To plant both sides of the road three feet from the inner line of the footpaths, young lime-trees that have

been properly trained and transplanted in the nursery not less than seven feet high, with strong stems and well-formed heads, a strong stake being driven into the ground close to each tree, to which the tree shall be tied with bands of hay or strong cord over packing of straw. The tree and stake to be encased to the height of five feet with sharp thorns cut from the fences, and bound round the same with willow or hazel bands in four or five places; the time and manner of removing and planting the said trees to be left to the discretion of the engineer.

The contractor will be allowed, provided he fill in and level the ground in a proper manner after the gravel has been removed, to take gravel from those portions of the estate known as allotments No. 167 to 205 inclusive, 286 to 297 inclusive, and 298 to 314 inclusive, and as paddock allotments 38 to 44 and 61 to 64, all inclusive, or on such other portions of the said farm and adjoining estate, called Farm, appointed in writing by the engineer, for the purposes of this contract. But the contractor is not to dig for gravel to a greater depth than five feet from the surface nor within a distance of sixty feet from the front boundary line of any of the allotments.

Provide and lay down under the footpaths at such points as shall be directed by the engineer, three hundred feet of six-inch socket metallic earthenware pipes of the best manufacture, at proper inclinations, for the purpose of carrying off and conveying the water from the water-tables into the adjoining ditches, the water-tables to be formed according to section, with rubble boulders or large flints (to be provided by the contractor), carefully pitched and packed, and *raking* to a proper inclination for carrying off the water.

THE BRIDGE.

To provide centring, turning pieces, laggins, scaffolding tackle, and every requisite for the construction of the bridge.

To excavate for the foundations, according to the depths shown in the drawings, or deeper should it be found necessary so to do, and level and pun the same to a smooth, compact, and hard surface for the reception of the intended brickwork. The brickwork to be performed in the best manner with compact, hard, and well-burnt stock bricks in the manner of English bond, such bricks and all other necessary materials to be provided by the contractor, the joints to be well flushed with mortar and grouted with liquid mortar at every second course. No four courses of the brickwork to rise more than three-quarters of an inch above the thickness of the bricks. The arch to be formed of three concentric rings of four and a half inch brickwork set in cement, and no whole-length bricks to be used running through two of the courses, all the face joints to be drawn in a neat, straight, and even line, and neatly flat pointed. The parapets above the ground to be neatly flat pointed on both sides.

The spandrels to be filled with concrete thrown from a stage nine feet high, and spread over the arch a thickness of six inches of the same kind of concrete, which may be formed of flints and a proper proportion of lime.

The foundations, counterforts, parapets, and other appurtenances to be performed of the full size indicated by the drawings, and the whole to be completed to the entire satisfaction of the said engineer.

The foundations to the ground-level as well as the arch to be set in cement, the rest of the brickwork in

mortar composed of the best well-burnt stone lime and sand, in the proportion of one-third of the former to two-thirds of the latter.

The parapet-walls to be coped with Portland stone twelve inches in thickness, tool-dressed at the sides, rounded at top, and in thickness equal to the width of the wall. The whole to be set in cement, and dowelled with three strong copper dowels in each stone, run with lead. No stone to be less than three feet in length. The contractor to provide all bricks, stone, mortar, cement, and other materials, together with all cartage, tools, tackle, gearing, labour, and workmanship requisite or necessary for the thorough formation and completion of the bridge, road, footpaths, and other works specified and set forth in this schedule, the whole of such works to be prepared to the entire satisfaction of the said surveyor, and to be left or given up by the contractor in a clean, finished, and perfect condition.

Note.—With reference to the foregoing contract, the formation on which the gravel was laid being generally sound and firm, bavins were required in only two instances, one being over the embankment at the bridge. These were cut from the hedges and applied in the green state, and, with the exception of gorse, perhaps thorns of good growth form the best bavins that can be used. I have seen gorse that had been buried ten feet deep in a sandy soil for more than seventeen years, which, when dug up, was as fresh, to all appearance, as the day when it was first put down.

The road is not drained, as some delay was anticipated in this respect from the Local Board of Health, but the water-tables are broad and well-paved, and there is an inclination from each end of the road to the

bridge in the centre, so that the water finds its way down, and is carried into the brook by metallic earthenware pipes put under the footpaths at the four corners of the parapet wall of the bridge. The road is eighty feet wide inclusive of the two footpaths, which are each twelve feet wide.

II.—*Specification of Works to be done in Constructing and thoroughly Completing the* DRAINAGE OF ROADS *to the Estate, belonging to , according to Plans and Specifications prepared by their Surveyor, , under whose directions and superintendence the Works are to be carried on and completed.*

The contractor to provide all the materials, labour, carriage, tools, planks, barrows, and all the implements necessary for the works executed as hereinafter mentioned.

To dig out the ground to the required depth for the mains, cross drains, and cess-pits, also for the proper formation of the roads and paths, and perform all other digging that may be required.

To grub up and clear away all the fences, including the boundary fences, belonging to the estate. In digging the trenches for the drains the contractor to excavate the trenches to be opened at least one foot wider than the diameter of the pipe or brick drain intended to be laid. The bottom of the trench to be hollowed out to the exact form and size of the lower half of the pipe, which will be embedded in it; any irregularity in the trenches to be filled up with gravel or clay firmly rammed in, but where the ground would not present

a sufficiently firm foundation for the pipes, the contractor to execute to such increased depth as may be necessary, and shall make good to the required form and level with concrete.

In laying the drains in the ditches of the present parish roads, the ditches to be thoroughly cleaned out, and a bottom of hard rubbish formed for bedding the pipes.

To fill up the trenches of drain pipes where they cross intended roads, with concrete formed of six parts of unscreened gravel and one part of fresh ground stone lime.

The soil on each side and six inches over the pipes to be carefully laid in, so as not to disturb them, and solidly rammed down. The trenches to be then filled in with layers of earth twelve inches deep at a time, each layer being well rammed over the whole surface. The first layer to be placed over the pipes with a shovel and not from barrows. The pipes not to be walked upon until this is done.

To form the bed for new roads and paths, so as to leave sufficient depth for the materials hereinafter mentioned, removing the hedges, timber, and surface of the ground where required, filling up the hollows to a hard consistency. To deposit the turf and mould outside the footpaths, and any of them that may remain to become the property of the vendor.

To form the roads of a total thickness of fifteen inches, the first layer to be composed of gravel nine inches thick, free from too great an admixture of small stones, clay, or sand, and entirely free from refuse or rubbish, the second and third layers, each three inches thick, to be of gravel passed once through a proper screen.

To form the paths of one course of three inches of screened gravel and one course of fine hoggin; to form

footpaths, and to make good to the existing roads bounding the estate.

Sufficient gravel, of a quality satisfactory to the surveyor, is estimated will be found on the estate.

It may be dug for the above purposes from such parts as the surveyor may direct, but the contractor is to fill up and level all parts where gravel may be excavated.

All sand and gravel that may be excavated and not required in the performance of the works, to remain the property of the vendors, and to be deposited on such parts of the estate as may be directed by the surveyor; should the quality of the gravel be not approved by the surveyor, the contractor to find sufficient gravel of approved quality.

To deposit and level all superfluous earthwork on such part of the estate as may be directed; to clear and cart away all rubbish.

To execute all brickwork in Roman cement necessary to form all cess-pits for the gully shoots, with their inverts.

The bricks to be of good sound, whole, hard, well-burnt stocks of uniform shape.

The Roman cement to be the very best, used fresh, and mixed with clean, sharp sand, in equal proportions.

To lay glazed stoneware pipes of the several forms and dimensions shown on drawing, and of the following dimensions and thicknesses:

12 inch	. .	$1\frac{1}{4}$ inch in thickness
9 „	. .	1 „
6 „	. .	$\frac{3}{4}$ „

To provide all junction-curves and tapering lengths of the most approved kind.

To lay for each house six-inch curved junctions and

six-inch pipes up to the frontage line of each plot, where single drains are shown using one junction.

To provide six-inch curved and other pipes, and connect the gully shoots with main drains.

To connect with bell mouths all existing drains with the new line of pipes.

Previously to the pipes being lowered into the trenches they shall be fitted together dry on the surface, and matched, so that when jointed in the trench they may form the most accurate and truest possible line of tubes.

To lay the pipes truly in line and gradient throughout; the ends of all junctions laid in for any future house-drains to be closed up with a piece of tile or slate, and a small stake to be driven in opposite each junction.

The pipes to be sound, well burnt through their whole thickness, impermeable to moisture, and of smooth interior surface; the joinings of the parts perfectly sound; and the pipes free from cracks, flaws, blisters, and all other imperfections, circular in the bore, of true form in length, whether straight or curved, internally of the full specified diameter, and of uniform thickness. The joints to be socket or half socket, and, alternately, in joining the lengths, the socket of the pipe shall be neatly filled and rammed with clay, well tempered and worked to the proper consistency; the end of the next pipe being then carefully placed in, shall be bedded and surrounded externally with a band or layer of clay, extending three inches each way beyond the external line of each joint, and tapering off from three inches in the middle. Especial care to be taken that this band is made perfect and tight on the under part of the joint. To insure this, and to allow of the continuous bedding

of the pipe, the bottom soil must be dished out at every joint.

The interior of the pipes to be carefully freed from all dirt or superfluous clay as the works proceed, for which purpose a mould, sufficiently large to pass two joints from the end of the pipe last laid, to be continuously worked through.

To properly bed on cess-pits cast-iron gully gratings and frames twelve inches by twelve inches, in separate pieces; the grates to be made to open and fasten with cast-iron catches, pinned to the grates with wrought-iron pins.

No line of pipes shall be covered until they have been examined by the surveyor, or clerk of works appointed by him, and directions given to that effect.

To take up, refix, and make good the present rough fence, and fence off the roads, new and old, with cleft fencing; three rails of a similar description.

GENERAL CONDITIONS.

The levels from which the section is made are believed to be accurate, but the contractor must verify all data with which he may be furnished, should he think fit, as he will be held responsible for any error.

The contractor shall give all necessary notices in writing to all persons having authority over roads, or other property or works, liable to be affected by the execution of the contract.

The contractor shall execute with the best materials and workmanship of the several kinds the whole of the works comprised in the drawings and specifications; they are intended to include whatever may be requisite to render the works complete, but should anything be accidentally omitted which may fairly be implied as in-

cluded in the contract, the same shall be executed at the expense of the contractor.

CONDITIONS OF TENDER.

The surveyor to have the power of refusing to accept any tender; and no claim shall arise if he thinks proper to decline to accept any one.

The tenders to state in one sum every matter or thing contained in the contract.

The tenders to be sent, &c.

Payment, 75 per cent. as the work proceeds.

The balance on completion, except 10 per cent. on total amount, to be kept in hand four months as a security against repairs (*vide* agreement).

The works to be completed in months after signing the contract.

III.—*Specification for making Roads, open Drains, and other works in , in the County of .*

INCLOSURE.

The work to be done consists in making four roads and nine open drains; and also to widen and deepen the outfall ditch leading from the side of the , and to clear away a portion of the fence at the corner of , in order to widen the space for the intended new road and drain at that point.

OPEN DRAINS.

The drains to be excavated and formed (which shall be the first work done) are nine in number, in the posi-

tions indicated on the inclosure map, and numbered 1 to 8.

The soil through which the drains are to be made is generally clay and gravel.

The rate and length of the inclinations of all the drains, and the widths of the bottoms, are marked in blue lines and figures on the sections of drains, and they are to be formed strictly in accordance therewith, unless otherwise directed by the valuer.

Quick mounds are to be made next to embankments, and for this purpose the best top soil is to be reserved, of which the contractor is to form such mounds as will be required of the form and dimensions shown on the general cross-sections.

The sods upon the lines of the drains and roads are to be taken off and laid aside, and all the earth that may be taken out of the drains is to be used as hereinafter stated, for the purpose of forming embankments of the roads, and filling in hollows of same, and those parts of the old brooks or water-courses which will be abandoned for the new water-courses, are also to be filled up and sodded over. Any surplus earth that may not be required for the above purposes shall be either placed in heaps or spread as may be directed by the valuer.

The general cross-sections of the drains are to be as follows, viz. the side slopes in clay, when the drains do not exceed 5 feet in depth, to be 1 to 1, but above that depth $1\frac{1}{2}$ to 1. In gravelly or sandy soil the slopes are to be $1\frac{1}{2}$ to 1 for all depths, and to be sodded for the whole depth; and where the drains may be cut through soil which is part clay and part gravel or sand, the gravelly or sandy parts are to be sodded; but should it be found that the soil through which the drains may be cut will stand at steeper slopes than those above mentioned,

it shall be competent for the valuer to direct the formation of the slopes as he may think fit.

All roots of trees must be taken out or cut off where they intrude into the drains.

Wherever roadways are required to be formed from the public roads to the adjoining lands over the drains or culverts for drains crossing the roads, they are to be constructed of the form and dimensions indicated on the plan and section, and the contractor must state a price in the schedule for constructing one of each kind, so that more or less in number can be directed to be executed by the valuer as required. And they shall be of the best brickwork, set in good lime, mortar, and cement, in those parts indicated by the drawing.

ROADS.

The roads to be made are four in number, and are laid down on the inclosure map. The first commences at the point marked *a*, passes *b*, and terminates at the point *c*, numbered in red 1 on the map; the second commences at *b* and terminates at *d*, numbered 2; the third commences at *c*, passes *f*, and terminates at *g*, numbered 3 on the map; the fourth commences at *f*, and terminates at *h*, and numbered 4 on the map.

All the roads are to be formed 30 feet wide, and gravelled 15 feet wide, of the form shown by the cross sections for roads.

The centres of the roads, when completed, are to have a rise of $10\frac{1}{2}$ inches above the water tables. The water tables are to be level with each other.

The forming is to be made in accordance with the general cross-section of roads. The lines of roads are to be perfectly cleared of all roots, and the holes caused by removing them are to be filled up solid and rammed down.

The roads are generally to follow the inclination of the surface of the ground, except in cases where hollows occur, and where embankments are shown on sections. The surplus earth from the excavations of the drains Nos. 2, 3, and 4, is to be used in raising the surface of road No. 1, at the hollows where these drains intersect the said road, as shown on section; where hollows occur in any of the roads, they shall in all cases be filled in so as to render the roads of as even an inclination as may be. Where embankments are made, the slopes are to be formed at 2 to 1 and sodded, and are to be formed according to the cross section.

The drains and forming having been completed to the satisfaction of the valuer, the metalling is to be spread upon the part left for it to the depth of 9 inches for the whole width of 15 feet. The gravel is to be procured from any part of the , or, if none of sufficient quality can be found there, it is to be taken from a field belonging to , situate near to the east side of the . Where gravel has been excavated, the surface is to be properly levelled down and sodded or soiled; all the gravel shall be properly screened, and the large broken, so that none of it shall be larger than will pass through a circular ring $2\frac{1}{2}$ inches in diameter. The quality of the gravel used, and the manner and place of its excavation, are to be subject to the approval of the valuer.

OUTFALL DITCH.

The ditch is to be widened and deepened by clearing away a portion of the bank, as shown on the plan and section, for the length coloured red on the plan, and the remainder of the ditch deepened as shown on section.

BANK BY

This is to be removed for the distance shown on the plan for the forming of the road and drain shown thereon.

The contractor will be required to keep the metalling of the roads raked in smooth, and an additional quantity supplied, if necessary, for six months after the whole work shall have been pronounced by the valuer to be completed, or to such time as the certificate of the justices of their being properly made, shall have been given; and for the same period all the drains and other works in connexion with them are to be maintained and kept in repair, and free for the passage of the water.

GENERAL CONDITIONS.

The contractor, upon receiving notice from the valuer, shall have possession of the land, and shall commence the roads, drains, and other works, and must proceed from day to day with them until completed.

The valuer will put in level-pegs, or other marks, to indicate the positions, inclinations, heights, and depths, of the works, but the contractor must satisfy himself that the works so set out are in accordance with the plans, sections, and specifications.

The contractor is to find all materials for the several works—viz. labourers' tools, and other implements, and the contract sum is to include the use and employment of the above in the execution of the several works; and all the above are to be provided in sufficient quantity and quality to enable him to proceed with the work efficiently and with proper expedition, so as to ensure the completion of the works in the manner and style specified, and in the time to be agreed upon. But should

the valuer object to any of the tools, implements, and materials, either in use or brought upon the works in order to be used, as insufficient or incapable of work, the contractor is, upon notice, to remove them, and provide others which shall be satisfactory to the valuer. And in case he shall refuse or neglect to remove such tools, implements, or materials, the valuer shall remove them and provide others, and may cause them to be used and employed at the cost of the contractor and his securities in the performance of his contract. And should the contractor refuse, neglect, or become incapable of proceeding with the works with due expedition and efficiency, and not, in the judgment of the valuer, in a satisfactory manner, the valuer, by notice to his securities, shall call upon them to perform and fulfil the contract; and should they also refuse, neglect, or become incapable, and should they not set about and continue the works according to the plan, sections, and specification and the terms and conditions of the contract within fourteen days from such notice, the valuer shall take possession of all tools, implements, and materials which shall be on the several works, and shall use and employ them, and shall procure and provide others, and employ foremen, labourers, and horses, and shall proceed with all or part of the works, and shall pay and deduct all costs and charges which he shall have incurred from and out of the money which shall be in the hands of the valuer, as hereinafter provided. And should the costs of such works, or any extra works which may be found necessary and be executed under the contract, exceed the contract sum, and the sum which would have been paid to the contractor for extra works, the securities are to make good and pay all such sums which are over and above the said contract sums. Should other works, or any extension of those shown on

the plan and sections and set forth in the specification, be found necessary to be executed, the contractor shall, upon notice from the valuer in writing, undertake them and complete them according to the plan, sections, and specification, or such other plan, sections, or specifications which the valuer may require, provided that all such extra work shall have been ordered in writing by the valuer, and a price or sum agreed to between him and the contractor; and should any extra work or diminution be ordered in writing by the valuer, such extra work or any diminution is to be estimated according to the schedule of prices hereunto annexed, but should the schedule not specify any particular kind of work which may be required and ordered as hereinbefore directed, the contractor is to send in a tender to the valuer for such work. But no such extra work or diminution shall in any way annul or invalidate any of the terms, conditions, or directions contained in this contract, or the plans, sections, and specification.

All the materials, whether supplied by the contractor or not, are to be the best of their kind, and found in ample quantities for the proper fulfilment of the contract, and the workmanship to be the best for the several parts of the works, and performed with due skill and care, so as to ensure the performance and completion of the works in the best manner, and to the full satisfaction of the valuer; and as to the roads, so that the certificate of the justices of their being properly made may be obtained.

The contractor must take the whole responsibility of the works, and should any unforeseen difficulties arise from bad weather, or from any other cause, involving a greater expenditure of money and loss of time than the contractor expected at the commencement of his contract, he or his securities must proceed with the re-

mainder of the work, and no allowance will be made for any such casualty.

The contractor, or his securities, from the date of the certificate of the valuer of the due fulfilment and completion of his contract, shall commence, and continue to maintain and keep in repair, all the works fit for the purposes for which they are severally intended, and upon such terms as are hereinbefore specified for six months from the date of the said certificate, and he is to supply all new materials and labour, and the expense of such maintenance and keeping in repair shall be included by him in his total contract sum; and he shall repair, and build up, and make complete any works which may fail, although he shall have obtained the certificate of the valuer of their due performance.

The contractor, or his securities, is to make good, and repair, and compensate for any damage that he, his agents, or men may do during the progress and maintenance of the works; and should it be necessary to remove any trees for the purpose of performing and executing the works, he is to give notice to the valuer, who will direct their removal by the contractor, and he is to act in all respects as the valuer may direct. And he is not necessarily to dig holes, trespass, or make roads or tracks across or about the and other lands; and wherever it is necessary to dig, or cut, or make passages for carts, waggons, horses, &c., he must fill up, repair, and soil them over, as it is hereinbefore stated. In case of refusal or neglect, the valuer will repair such damage, and the cost will be paid and deducted out of the money in the valuer's hands.

Printed copies of the specification and form of tender will be furnished on application, but the contractor must provide copies of the plan and sections at his own expense, and he must be responsible for the correctness of such copies, as no allowance or compensation will be

given in case the works are not executed strictly in accordance therewith (except as may be agreed upon for any extra works or diminution thereof), and any works executed contrary thereto must be taken up and reconstructed according to the plan, section, and specification.

In case of differences arising between the contractor and the valuer, as to the construction or meaning of the terms, conditions, and provisions for the works to be executed, and set forth in the plan, sections, and specification, an indifferent and disinterested person, as may be agreed upon, shall be called in, and the question referred to him, and his decision shall be final. And should the valuer and contractor not be able to agree upon a person to decide the differences, the valuer shall name to the said contractor, in writing, six persons, one of whom is to be selected by the contractor within six days, and the decision of the person so selected shall be final; and should the contractor refuse or neglect for six days so to select one of the six persons who have been so named by the valuer, the matter shall be left to the decision of the said valuer, whose decision shall be final. But in case the works are not being executed in a proper or satisfactory manner, or bad and inefficient materials, tools, implements, carts, horses, labourers, workmen, centerings, or other things, are being used and employed by the contractor, the decision of the valuer shall be final, and his directions as to remedying any defects, or providing other tools, materials, implements, or labour, must be followed under the conditions and stipulations hereinbefore stated.

The contractor is to state in his tender the time—not exceeding four months—within which he will complete all the said works as set forth in the plan, sections, and specification, including such other extra works as may be ordered by the valuer, and the repair or reinstating

of any defective or imperfect works which may have been disallowed by the valuer; and such time is to be computed from the time at which the valuer shall give notice for commencing such works. But in case he shall not have completed the works fully to the satisfaction of the valuer, from any cause whatever, by the time specified in such tender, he or his securities shall forfeit and pay the sum of twenty pounds per week for every week (not exceeding four) during which such work remains incomplete and unfinished; and fifty pounds per week for every week after the first four in which such works shall remain unfinished or incomplete. And such limited time as stated in the tender shall include the time which may be lost or employed by the delay arising from the adjustment of any differences between the contractor and valuer, or their arbitrator, and he or his sureties shall be subject to like penalties for such delay. All penalties shall be made and paid out of money that may be in the hands of the valuer, and which otherwise would be paid to the contractor or his securities, and such penalties to be paid by way of ascertained and liquidated damages.

The contractor will be paid monthly, on the valuer ascertaining the amount of work done within the month, less twenty per cent. of the valuer's estimate, which sum so deducted will be retained in the hands of the valuer, until the contractor shall have completed the whole of the works, and on the completion of all the works to the valuer's satisfaction, the contractor is to be paid half the sum so retained, and when he shall have maintained and kept in repair the works for the six months from the date of the valuer's certificate, and to his satisfaction, and when the certificate of the justices shall have been given, he is to be paid the remaining half of the sum so retained in the hands of the valuer.

The contractor will be required to enter into a bond,

at his own expense, for the due performance of works, extra works, and maintenance of the same within the time specified, together with two sureties jointly and severally for the sum of five hundred pounds in addition to the twenty per cent. deduction to be retained in the hands of the valuer as hereinbefore stated.

SCHEDULE OF PRICES.

	£ s. d.
To excavating drains . . . at per cubic yard	
If three feet deep . . . . „	
If four ditto . . . . . „	
If five ditto . . . . . „	
If six ditto . . . . . „	
If seven ditto . . . . . „	
Common forming, including water-tables, at per foot run	
Excavating, carrying, and forming embankments at per cubic yard	
Metalling roads . . . . at per rod run	
Executing brickwork in culverts and side approaches, including excavating foundations, scaffolding, centering, labour, and materials, to forms shown on sections at per foot run	
If two feet wide . . . . „	
If two feet six inches wide . . „	
If three feet ditto . . . . „	
Providing and laying six-inch socket-pipes, including excavations, &c.	
If three feet deep . . . . at per foot run	
If four feet ditto . . . . . „	
If five feet ditto . . . . . „	
If six feet ditto . . . . . „	
If seven feet ditto . . . . . „	
Providing and laying nine-inch socket-pipes, including excavations, and making good after laying same .	
If three feet deep . . . at per yard run	
If four feet ditto . . . . . „	
If five feet ditto . . . . . „	
If six feet ditto . . . . . „	
If seven feet ditto . . . . . „	
Providing and laying twelve-inch socket-pipes, including excavations, &c.	
If three feet deep . . . . at per yard run	
If four feet ditto . . . . . „	
If five feet ditto . . . . . „	
If six feet ditto . . . . . „	
If seven feet ditto . . . . . „	

FORM OF TENDER.

To the Valuer in the matter of

The undersigned do hereby undertake to perform all the works, matters, and things necessary to be done in the execution of the roads, culverts, drains, and other works under this inclosure, and in cutting, forming, and completely finishing and maintaining the said works, as shown on the plans and sections produced to me, at the office of the valuer , and described in the specification furnished to me, and in accordance with the conditions thereto attached, and to the entire satisfaction of the valuer, and under the direction of such officer as may be instructed by him to superintend the execution of the said works, for the sum of , and do hereby propose as responsible sureties of and of who are willing to be bound with jointly and severally, in the sum of five hundred pounds, for the due and satisfactory performance of the whole of the said works, in the manner above-mentioned, and for the maintenance thereof in complete repair for six months from the completion of the same.

Signature
Address
Date

The tender to be sent under cover, sealed, and directed to , on or before o'clock in the forenoon of Saturday, the day of , after which time no tender will be received.

The following form should be filled up and signed by the contractor's proposed sureties:

I* hereby engage to be jointly and separately bound with and† in the sum of five hundred pounds, for the due performance of the works necessary to be done in the execution of the roads, culverts, drains, and other works under this inclosure, according to the plan, sections, specification, and general conditions, and the schedule of prices therein referred to.

As witness my hand this day of

Signature

Address

Note.—All tenders not made in the form supplied, or not accompanied by the forms signed respectively by each of the proposed sureties, stating their willingness to enter into the required bond, will be rejected.

IV.—*Abstract of Specification for Works to be executed on at .*

EARTHWORK

Comprises the removal of all clay, earth, stone, and other débris not required for ballast, from the cuttings to the embankments for the formation of the under surface of the roads and paths. To properly turn and trim such under surface for the deposit of the metalling thereon, and also to carry such embankments and cuttings to the heights and depths shown on the accompanying plans and sections, forming all the slopes to an inclination of two to one, and removing all earth, clay,

* Insert name of contractor.

† Insert name of other surety.

or other *spoil*, trees, fences, bushes, stumps, and roots, that may interfere with the said formations of the roads or paths, and that may be required for the formation of the same, removing all superfluous earth, clay, and other spoil from the cuttings, not required in the embankments for the purposes of filling up the hollows, cavities, and ditches on the sides of the road, levelling and filling up the pond; and should such superfluous earth, clay, or spoil prove insufficient for such purpose, the deficiency to be supplied by giving a gradual inclination or batter to the adjoining ground by removing such required earth or soil therefrom, and such inclination shall in no case be greater than one in twelve, unless by the approval of the surveyor.

The slope on the east side of the road on plan, and the embankment on the north side of the road on plan, shall be turfed over with growing turf or sods taken from the roads in excavating; such sods to be well beaten to a uniform surface, and properly placed on the surface of the said slopes.

In no case shall any surface soil be used for filling the embankments, the first spit of such surface soil being reserved and replaced on the surface where the same may be required by the removal of the clay or ballast.

ROADS AND PATHS.

The red lines in the longitudinal sections show the level of the surface of the metalling in the centre of the road when settled down and completed.

The formation surface of the road for receiving the metalling shall be of the shape shown in the Drawing* , and the metalling shall consist of hard, well-burnt clay, and clean, strong, screened, and good binding gravel free from superfluous sand, earth, or

* See Figure 1, Plate VII.

rubbish, with no pebbles, flints, or other stones larger than will pass through a gauge of two and a half inches. The whole of such gravel to be passed down a screen of five wires to an inch.

The footpaths shall be of the shape shown in the cross-sections, and shall be formed of clean, hard-burnt clay, and fine, good-binding gravel screenings, more particularly described as to thickness in the accompanying cross-sections referred to.

The clay for burning into ballast shall be obtained from such places on the ground, and be excavated to such a depth, and be burnt or calcined upon such sites, as the surveyor may direct.

The pits from whence such clay is obtained to be afterwards levelled by sloping the adjoining ground to such an inclination or batter as the surveyor shall direct, but which in no case shall be greater than one in ten, and the burning of such ballast shall be carried on in the most approved method, the quantity of coals per cubic yard, the supply of clay, and other arrangements, to be made to the entire satisfaction of the surveyor.

Such portion of the main road, Section , Drawing , already formed and metalled, shall, after the certificate of the surveyor is obtained certifying his approval of the strength and general stability of the same, to be allowed to remain, except where the sections in reference hereto shall otherwise determine.

At those points where there is a break or change of gradient the contractor shall, without any extra charge or addition to his contract, level, ease, adjust, and round off such places in a proper and workmanlike manner, so as to avoid any sharp or unpleasing appearance and outline on the surface of the roads at those points, and thereby disguising the actual points of changes of gradients.

POST AND RAIL FENCING.

The land shall be protected from the main roads by a strong, sound larch post and rail fencing shown in Drawing , Figure . The posts to be creosoted, charred 6″ above and below the ground surface line, and have proper mortices to receive the rails; a middle head* to be driven in the ground, and firmly nailed to the rails midway between each two posts. The whole to be provided and properly fixed by the contractor, and subject to the approval of the surveyor.

Three strong gates of larch shall be provided and properly erected at the entrances of the new roads and on plan, strong and proper fastenings and swinging-irons being provided for the same according to the annexed drawings.

CULVERT.

The culvert under the main road at **A** on plan shall be lengthened or extended at each end to the full width of the proposed new roads, as shown by the red lines on the general plan. The same to be executed in conformity with the section of the existing culvert unless it shall be hereafter determined to enlarge, the whole of the brickwork being properly pointed and boarded thereto and a secure concrete foundation obtained, *an inverted brick water-course*† and a brick coping being provided. The whole to be executed and finished in a substantial and workmanlike manner with sound, well-burnt bricks and strong cement, the contractor providing all the requisite materials, centering, planking, &c., and all tools incidental thereto. Replace the posts and hand-rails in accordance with Drawing .

* Commonly known as "prick-posts."—J. B.

† Usually called an "invert."—J. B.

DRAINS.

The draining shall be carried in the direction and at the inclinations shown on the sections and in the centre of the two blue lines on the general plans, or as near such centre as the surveyor may sanction.

The main drains shall be formed of strong, sound, well-burnt, glazed-stone, earthenware pipes twelve inches in their internal diameter, free from cracks, flaws, or irregularities, with perfect rims and well-fitting junctions and proper bends and curves, in accordance with the General Plan , Figures , including the side house drains to be six inches internal diameter, to terminate with double junctions, Figure , Drawing , and sufficient and proper double and single junctions, elbows, curves, and bends, to be provided for the whole works, to be efficiently and carefully laid at the inclines shown on the sections, and not to have any inequality or shoulder at the point of junction, and such junctions to be properly pugged with kneaded clay free from stones and sand.

The remaining main drains shall be formed of strong, sound, glazed-stone, earthenware pipes 9″ internal diameter, properly and uniformly laid, pugged, and jointed, with side house drains 6″ internal diameter, as before described.

A 12″ junction to be provided, and properly laid and jointed into the masonry of the culvert at on the general plan, and in accordance with the section, Drawing , Figure , being properly and substantially fitted and cemented to the outlet of such culvert . And shall provide and supply all the requisite materials for completing and executing such drainage and works, making all the necessary excavations. Removing all roots, trees, bushes, and other spoil that

may in any way interfere with the proper and substantial execution of such drains and works; cutting out, removing, and making good all loose, faulty, or unsound places, weepings, or springs; diverting or removing such springs, and puddling, or otherwise rendering substantial and firm, such unsound loose places, and filling up to the required level all cavities or hollows, ramming such fillings previous to laying in the pipes, so as to prevent any settlement and consequent displacement of the tubes, and after pugging such draining, firmly and uniformly pug and ram with clay, or, if requisite, concrete, the space between the draining tubes, and the sides of the trenches cut for receiving the same, filling up all interstices, so as to thoroughly consolidate the same to the satisfaction of the surveyor, whose approval shall be obtained before the trenches are further filled; afterwards fill the trenches with earth, taking care not to disturb or displace any of the tubes in so doing. In the event of any displacement, or any injury, to such tubes or pipes by reason of filling the trenches, or otherwise, during the period of six months after the date of the completion of the contract, the same shall be re-laid and made good at the *contractor's* own cost and charge.

The whole of the materials, pipes, bricks, clay, or cement, together with the workmanship, shall, previously to being used or considered as finished, be submitted to the surveyor for his approval; and, unless such materials and workmanship are provided and executed to his satisfaction, other and proper materials and workmanship shall be provided by the contractor for the works which shall have been condemned, and the work shall be finished in a proper and substantial manner, as the surveyor shall direct.

GRATINGS, ETC.

Provide and fix cast-iron gratings 15″ by 12″, three such gratings as shown in Drawing , Figures , for admitting the surface-water into the gully traps, and properly fix such gratings and 4″ brick cess-pits at the points marked on the drawings; supply all the requisite materials for such purposes, together with 12″ sound, *glazed stone*, earthenware gully traps for such gratings, and the required length of four stone earthenware pipes, with all necessary junctions, elbows, curves, and bends, for forming proper and sufficient inlets and communications with the nearest house or main drain, such pipes, junctions, or traps to be properly jointed or pugged with fine kneaded clay.

The excavation filling and all other works incidental thereto shall be performed in a good, sound, and workmanlike manner. Provide and fix good, sound, cast-iron gratings at inlets of the main drain at , and also at the outlets on general plan; and provide and secure the draining tubes of such outlets by circular brick culvert mouths, as shown on Drawing , providing all the necessary bricks, cement, mortar, and other materials requisite for such purposes.

Such trees and fences as the surveyor shall direct shall be felled, trimmed, or removed on the roads (if required); and the fences that interfere with the formation of the proposed roads shall be removed, together with the sheds at present on the ground; and the same shall be disposed of in such a way as the surveyor shall direct and determine, he being fully empowered to use and employ any such trees, fences, gates, and sheds in the fencing, or otherwise intended to be carried out, and to deduct from the contract sum the value of such materials and labour as may be thus disposed of; and before the completion of this contract, all earth, spoil, rubbish, or

other débris shall be removed from the ground, leaving the works in a finished and workmanlike state.

To maintain the whole of the works for six months from the day of completion, and to deliver up at that time in perfect, substantial, and workmanlike condition all the matters and things included in this specification.

And should it be found desirable by the to add or deduct from the works hereinbefore specified to be performed, they shall be at liberty to make any such deductions or additions at the rates and prices stated in the schedule annexed to the tender, which prices so stated are declared to be the true and actual prices at which the contract is taken, or at the rates and amounts upon which the tender is formed; and if anything should be omitted in this specification which may be necessary and proper for the due performance and completion of the said several works, according to the true intent and meaning of the said specifications, plans, and sections; or should any difference of opinion arise as to the meaning and intention of the same, or any part thereof, the decision of the surveyor shall in all such cases be final and binding.

The whole of the materials and work for the various purposes specified in this contract shall be carried out to the satisfaction of the said surveyor, and no work or materials shall be considered finished until he has inspected and approved the same.

Should it be found necessary to add to the works hereby intended to be performed as additional or extra works, no such extra works shall be commenced or carried on by the contractor without a written certificate from the surveyor authorising the commencement of such extra works. Any extra works formed by the contractor without such certificate shall not be allowed for.

The contractor shall receive monthly instalments on the first day of every month 75*l.* per cent. on the

amount of materials used and works executed, such amounts to be ascertained from time to time by the said surveyor, and a certificate by him given to the contractor to that effect. And no money shall be paid to the contractor not stated on such certificate and signed by the said surveyor. The remaining 15*l.* per cent., making 90*l.* per cent. of the amount of the contract, shall be paid on the surveyor's certificate within three months after the completion of the said works. And the last instalment of 10*l.* per cent. six months after the entire completion of the works, the works having been kept in good repair and order up to that time at the contractor's expense.

Parties tendering for this contract, and whose tender shall be accepted, will be required to execute a proper contract for giving effect to his tender, as soon as he shall be called upon to do so, and shall provide two sufficient securities, and enter with them into half the amount of this contract sum for the due and satisfactory fulfilment of the same.

PRESCRIBED FORM OF TENDER.

To .

Sir, 18 .

willing and hereby tender to undertake the works connected with the levelling for and formation of the roads and footpaths, gutters, surface, and other drains, funnels, or culverts; and fencing, supplying, and fixing all gratings, gully-traps, draining-pipes, bricks, cement, post and rail fencing, road metalling, and other appurtenances. The supplying, laying, and jointing of sundry earthenware pipes under the roads. The diversion of a public drain and the excavation embankment, and shoring in and about the same, and all other various works incidental thereto. The supplying the pipes and all other requisite materials for the formation of various

other main and branch drains, with the excavation, shoring, embankment, and various other works incidental thereto. The restoration of the roads and gravel surfaces, and the providing all the requisite metalling, soiling, tools, labour, and other materials, for all and every other work or works, as required by the specification, drawings, plans, and sections, to be seen at the office of Mr. , Surveyor, , according to the terms, obligations, and considerations, recited and set forth in such specification as aforesaid, at and for the sum of , and engage to find responsible sureties, as required, and to enter with them forthwith into an agreement with the , in the terms of the said specification, for the performance of the several works on or before the 1st day of , one thousand eight hundred and , subject to a fine or penalty of 5*l.* per diem, should the same or any part thereof be unfinished at that date, such fine to continue in force until the works hereby undertaken to be performed are fully and completely executed, and agree to execute any other works that may be ordered extra of the contract. And to allow and deduct from the contract sum for the works not executed, although included in the contract at the rates and prices stated in the underwritten schedule, which, together with the sums and amounts therein also stated, declare to be the true and actual rates and prices, sums and amounts upon which this tender is founded, and further agree to keep and maintain the whole works in good repair six months after the time of completion, delivering up at the expiration of that time in good and substantial repair.

Remain, Sir,

Your obedient servant ,

£ *s.* *d.*

Schedule referred to, in which the several quantities ascertained and adopted by are fully stated, priced, and moneyed out.

Quantities.	Particulars of Works to be executed.	Price.	Totals.
			£ s. d.
cub. yds.	Removing all clay, earth or other spoil from the cuttings to the embankments, filling cavities, hollows, ditches, pond, &c., and stubbing and removing, and trimming and forming slopes and surfaces	9d.	
	Removing, felling, and trimming trees		
sq. yds. .	Turfing slope, as specified . . .	1s.	
	Metalling :		
cub. yds.	First coat metalling for roads, being burnt or calcined clay spread on the formed surface of the roads	2s. 8d.	
,,	Second coat of metalling for roads, being strong binding gravel . .	4s. 3d.	
,,	Metalling for footpaths, burnt or calcined clay	2s. 8d.	
	Post and rail fencing :		
lin. rod .	Erecting and providing	5s. 6d.	
	3 entrance-gates, at each . . .	17s.	
cub. yds.	Lengthening the culvert under main roads as specified, at . .	20s.	
	Cast iron gutter, and other gratings, for surface drainage, and for protecting outlets and inlets to drains	20s.	
,,	Brickwork in mortar for same . .	20s.	
Each* . . .	Stone earthenware draining pipes, 12″ internal diameter	1s. 6d.	
,,	Bends to ditto	5s. 6d.	
,,	Double junctions to ditto . . .	8s. 10d.	
,,	Single junctions to ditto . . .	7s. 4d.	
,,	Stone earthenware draining pipes, 9″ internal diameter	1s. 1d.	
	Carried forward		

* These drain-pipes are each *two* feet long. Jenning's pipes, including saddles and soles, are three feet; the price per foot being the same.—J. B.

Quantities.	Particulars of Works to be executed.	Price.	Totals.
			£ s. d.
	Brought forward . . .		
Each . . .	Single junctions	4s. 3d.	
,,	Bends to ditto	3s. 6d.	
,,	Stone earthenware draining pipes, 6″ internal diameter	8d.	
Each . . .	Double junctions to ditto . . .	3s. 8d.	
,,	Single junctions to ditto . . .	2s. 3d.	
,,	Bends	2s. 3d.	
,,	Stone earthenware draining pipes, 4″ internal diameter	6d.	
Each . . .	Double junctions	2s. 3d.	
,,	Single junctions	1s. 9d.	
,,	Curves or bends	1s. 9d.	
Each . . .	Gully traps for surface drainage .	12s.	
	Fixing same	1s. 3d.	
lin. yds. .	Opening, preparing, and dressing trenches, laying pipes, and pugging joints with clay, and refilling trenches—12″ and 9″ pipes, according to specifications . . .		
,,	Ditto, ditto, 6″ and 4″ pipes . .		
	Add for removing sheds, waste, or surplus materials, trimming up, so as to leave the works in a complete and workmanlike manner, and for all contingencies, costs, charges, and expenses whatsoever incidental to the perfect, entire, and satisfactory completion of this contract, and keeping in repair for six months, in accordance with the plans, sections, drawings, and specifications . .		
	Amount of Tender		

V.—*Specification of Works required to be executed in the* Drainage *of the Estate at* , *for* .

The courses of the various drains, as well as their diameters, are marked on the accompanying plan of the estate.

The india-ink contour lines on the accompanying sections denote the present surface of the ground; the red lines denote the finished surface of the intended roads; the blue lines denote the bottom of the interior of the drains.

The curves in drains, at junctions and intersections of roads, to be struck from the same centres as the curved corners of the corner lots.

In order that the trenches for receiving the drain tubes shall be excavated to the proper depths, and no further, they are, in the first instance, not to be dug deeper than fifteen inches above the levels indicated in the sections for the bottom of the interior of tubes; at this depth they are to be a foot wider than the diameters specified for the tubes that are to be laid in them respectively; their sides from this depth upwards are not to slope more than the nature of the ground may render necessary, and it is anticipated that a batter of one horizontal to ten vertical will generally be sufficient.

Where necessary or required, the sides of the trenches to be supported with fir-boards and strutting of adequate and approved strength.

When the trenches have been dug to the depth and form of section above specified, the channel for receiving the tubes is, in careful hands, to be cut in the centre to the proper depth and cylindrical form, to afford a solid bed for the tubes without adjustment with loose earth

or ramming being necessary. The trenches for gully drains to have a uniform slope from the syphon at cesspool to the junction at main drain.

In the trenches, as thus prepared, the tubes are to be laid evenly and with their socket ends facing the current, each separate length examined inside before laying, and any rough projecting particles removed with the trowel that would be likely to afford a hold to any fibrous material passing down with the sewage. The more perfect parts of the inside surface to be invariably turned downwards; the joints to be pointed and surrounded with clay tempered of a stiff consistency.

The whole of the tubes required for the drainage are to have socket joints, and to be of the best quality, sound, well-shaped, and as free from rough particles projecting internally as they can be obtained.

The sockets to be formed in one piece with the tubes at the time of turning or pressing; they are to be not less than two inches deep, and to be rebated from the inside line of the tube sufficiently to admit of the joint being pointed, and also admit of the interior diameter of the tube continuing without interruptions at the joints.

The inside of the sockets and outside of the ends that are to be fitted into them are to be roughed, to afford a hold to the pointing.

A fragment of the ware, including a portion of a socket, and with the manufacturer's name attached, to be sent with each tender.

No allotment drains are included in the present contract, but a junction-eye to be provided as nearly as possible directly opposite the lower corner of each lot, or that which is next the direction of the current, for receiving a 6″ tube from the lot; in each eye is to be placed a burnt-clay tile, formed and provided for

that purpose, in order to keep out the earth until the allotment drain is inserted; these junctions to be laid so that the direction of the branch or eye shall have an upward inclination of about thirty degrees from the horizontal; the angle of inclination of the eyes for receiving the drains from gullies to be determined with reference to the slopes from the syphons, which slope will vary somewhat according to the depth the main drain is below the road surface.

Unless with express sanction to the contrary, no part of the drainage to be done by tunnelling, and the straight lines of drainage to be formed with straight tubes only, and the curved lines with curved tubes only, the latter being of slower or quicker curvature to accord as nearly as practicable with the curvature of the drain.

The upper ends of drains to be closed with bricks on edge, upon a footing of single brick on bed.

The branches from gullies to be formed of six-inch tubes.

The utmost care to be taken to leave the tubes everywhere perfectly clear of earth, or any other rubbish.

For each gully, a circular cesspool of half-brickwork in Roman cement, with inverted dome bottom, is to be formed as shown on transverse section, with four-inch tooled and perforated stone at top, in one piece, forming a level curb for receiving a shafted gully-grating. In the side of each cesspool, and immediately below the stone curb at top, a six-inch syphon tube, of the glazed stoneware, is to be securely fixed, as shown, to form an effluvia trap.

It will be found that, in order to give the eyes for the reception of gully drains the upward inclination specified (which will vary in different situations), it will be necessary, where there are pairs of opposite gullies, to

use single junctions, and make the eye for one gully succeed that for another; the gully drains may, at the same time, be kept of equal length by placing the one gully *not* opposite to the other by two feet, or the length of the junction tube.

The side entrances, with ventilation shafts and cesspools combined, are to be formed of the number and in the situations shown on the plan; they are to be built in Roman cement, in the form and of the dimensions detailed. The arched work to be nine-inch, in two half-brick layers; the shafts to terminate at the levels, shown, with hewn stone curbs; the entrance-shafts to have stout ladder-irons alternating, as shown; the end of the drain-tube entering, and that of the one leaving, the ventilation-shaft, to be inserted flush with the inner face of the brickwork; the bottom of tunnels to be paved with three and a half-inch droved flags, extending the full width, and bedded on upper offset at bottom of side walls; the earth to be well rammed round the exterior as the brickwork rises. The depth of the ventilation-shafts will be regulated by the depth of the drains from the finished crown of carriage-way.

The gully cesspools, side entrances, and ventilation shafts to be covered securely over with stout boards, as a temporary finish in lieu of gratings, until the road-making is in progress, the said boards to become the property of the estate.

The bricks to be used are to be the best stocks, sound, hard burnt, and well shaped; to be laid in old English bond, where it will apply, with close and solid joints, and every joint and course well filled and flushed in with cement. In the interior of the cesspools, ventilation shafts, and side entrances, the joints to be struck flush and smooth, but not tool-jointed.

The Roman cement is to be of the best quality, and

pure—obtained from a manufacturer approved by the surveyor. It is to be gauged with an equal proportion of sand, in small quantities, at the time of using. The cement and sand to be first well mixed together dry, and then the water added in due proportion. Care is to be taken not to add more water to cement after it has been once mixed, or to use cement after it has once set, or to disturb any brickwork after setting. The bricks to be immersed in water before laying.

The earth to be rammed solidly around gully cesspools, side entrances, and ventilation shafts. In filling the trenches, after laying tubes, the earth is to be well rammed down, in equal layers not exceeding nine inches thick, using proper care, in the lower portions, not to injure or derange the tubes, or remove the pointing from the joints.

The filling-in is to stop at the new-formation level of the roads; namely, fourteen inches below the finished surface of same, as denoted by the red lines on the sections.

The surplus earth resulting from the draining is to be applied in raising such depressions in the lots, and in the lines of road, as may be pointed out; the vegetable mould to be laid in the former, and the inferior or subsoil stuff in the latter. In the lots, the surplus stuff is to be spread out and regulated to the general level, or slope, of the surrounding ground, as the case may be.

The whole of the works specified are to be contracted for, for one sum; and it is to be stated in the tenders within what time the completion of the whole will be undertaken, from the date of signing the contract. The gross sum stated is to be understood to include all materials, workmanship, conveyance, apparatus, implements, and other costs and expenses, necessary and inci-

dental to the complete performance of the works, as set forth in this specification, and the accompanying drawings.

To each tender a list is to be appended, of prices at which the party contracting will undertake to execute such extra quantity of the various descriptions of work as may be required; and by which deductions shall be valued; and by which also the amount of work done and materials supplied may be computed, at the times of instalments being wanted.

The iron castings, consisting of side-entrance covers and ventilation and gully gratings, are not to be included in the present contract.

No tender will be entertained which does not implicitly comply with the requirements specified; and the directors do not bind themselves to accept the lowest.

The contractor will be required to enter into a bond, along with two sufficient sureties, for the due fulfilment of his contract, under a penalty of 3*l.* per diem, for every day's delay beyond the date agreed on for completion.

The contractor for the gross sum stated in his tender, and by the date subsequently agreed upon, is to execute and completely perform, substantially and workmanlike, of the best materials, and in the manner hereinbefore specified, all the various works set forth in the accompanying Drawings, numbered , as also in compliance with any further drawings and instructions that may be subsequently furnished for the more clear elucidation thereof, the whole being in every respect to the satisfaction of the surveyor. He is to superintend the work himself, or appoint a competent foreman to do so; and he is not to sublet any portion of the same without the surveyor's sanction. He is to watch and efficiently protect the works from injury, from whatever

cause—taking effective precautions for preventing the work sustaining injury from frost, and making good any damage that may occur from that or any other cause, so that the whole shall be delivered up in true fulfilment of the drawings and specification as contracted for. He is to be paid for the same from time to time at the rate of 75 per cent. on the value of the work done, the amount being in no instance, during progress, under 100*l.*—the remaining 25 per cent. being paid upon the surveyor's acceptance of the work as completed; excepting 100*l.*, which shall remain in the hands of the directors for one year from the date thereof, the responsibility resting with the contractor for any defects that may appear during the currency of that period, that may be fairly attributable to imperfect workmanship, or the use of improper materials.

The surveyor shall be entitled to require the employment from time to time of as many workmen as he may judge to be necessary to ensure the satisfactory progress of the works, likewise to require the discharge of any such as may prove to be of an incompetent or improper character. He shall be at liberty to suspend the works at any time, should he deem it necessary to do so, allowing an extension of time equivalent to the postponement on account thereof. He shall be empowered to require the immediate removal from the grounds of any materials delivered thereon which he considers of an improper description; and, during progress, to require the immediate deconstruction and re-execution to his satisfaction of any such work as may appear to him to have been executed improperly, whether in regard to materials or workmanship, or as showing a departure from the drawn or specified intention, being at liberty, in the case of the contractor's neglecting or refusing to comply with the notice given requiring the same, to

cause such deconstruction and re-execution to be done by some other party, at his (the contractor's) expense, and during the continuance of the contractor's responsibility for defects appearing after completion; failing his attending to these within ten days from the surveyor's sending him notice respecting them, the latter shall have power to employ some other party to remedy the same, and to cause the amount of the expenses attendant thereon to be deducted from the balance of the amount of contract remaining unpaid. And further, in case the contractor shall fail to commence these works within one week from the date agreed upon for his doing so, or, having commenced, shall at any time fail to proceed with the same in a manner satisfactory to the surveyor, the latter shall have power to determine and put an end to the contract, and every part thereof, and to award what sum shall, under the circumstances of the case, be paid to the contractor for the work done —if any. The whole of the works to be subject to the inspection of the surveyor, and of his clerk of the works; and, in the absence of the former, the latter shall be empowered and required to exercise full authority fairly and moderately.

Without the production of the surveyor's written authority, no day-work or other extra will be paid for, and without his certificate no payment will be considered due. His award, also, in all disputes upon matters and things relating to this contract, shall be final and binding.

Should it be found expedient, during the progress of the works, to deviate in any way from the original intention, as set forth in this specification and the accompanying drawings, the same, whether an increase, reduction, or omission, shall not in any respect invalidate the contract; but the difference occasioned thereby

shall become an addition to, or deduction from, the amount thereof, as the case may be, one day of extra time being allowed for every five pounds value of the former, and a corresponding reduction made for the like value of the latter.

The contractor is, at his own cost, to make any temporary drains, and to perform any other temporary operations that may be necessary for keeping his work clear of water, or for the due fulfilment of his contract.

Whatever work may be specified and not drawn, or drawn and not specified, is to be executed as fully as if described in both these ways; and should any workmanship or materials be wanted, which are not either directly or indirectly denoted in the specification or drawings, but are nevertheless necessary for the proper carrying out of the obvious intention thereof, the contractor is to understand the same to be implied, and to provide for it in his tender as fully as if it were particularly described or delineated.

The clerk of the works will afford facilities to the contractor to provide himself with such copies of the specification and drawings as he may require for his own use in executing his contract.

The stumps and numbers thereon, defining the lots into which the estate is divided, are not to be disturbed by the operations specified.

The contractor is to give notice in due form, in writing or by attendance, to the proper officers, parochial or other authorities, requiring or entitled to the same in respect of the works embraced by the present contract, and is to pay all such fees as may be or become due in respect thereof.

The works specified are to be executed to the entire satisfaction of, and delivered up complete and perfect to the society's surveyor.

VI.—*Specification and Particulars of the several Works to be done and Materials required in the formation and construction of a* New Street, *reaching from the Junction of , and the old Parish Road leading to the , to form a Junction with that portion of the Street already constructed in front of , in the Town of , such New Street to be a continuation of .*

The contractor to provide the whole of the labour, tools, and materials of every description, but no royalty will be charged by the for stones required for metalling, or gravel.

All the necessary excavations and filling to be performed so as to bring the surface of the street to its proper form and level, as shown in the sections, and any surplus earth that shall not be required for filling in, or other purposes, in making the street, must be carted away, or otherwise removed by the contractor, to such part or parts of the said town as shall by the surveyor be directed.

The entire clear width of the street to be thirty-six feet throughout the whole length, allowing twenty feet for the carriage-way, and eight feet on each side for the footpaths.

The carriage-way to be close paved the full width of twenty feet, upon the formation, with good, hard, paving stones, none of which shall be less than six inches in diameter in any direction; to be laid with the flattest side downwards, so as to form a good bed, and to be well pinned or bound together with scabblings. The pitching to be covered with nine inches thickness of good, hard metalling, broken so as to pass through a

ring of two and a half inches in diameter, and no pieces less than two inches in diameter will be allowed in the metalling; over the metalling put a top dressing, two and a half inches in thickness, of hard, clean, and well screened gravel.

The footpaths to have curbing-stone at the edges of stone, well placed in true line at the top, and packed close; so placed as to be level with the finished surface of the footpath at top, and to stand four inches higher than the top surface of the metalling of the carriage-way; no stone to be of less dimensions than fifteen inches long, four inches wide, and twelve inches deep. Cover the surface of the footpaths with good hard gravel six inches in thickness, with three inches in thickness of fine hoggin therein to finish the same, with a slight inclination of the surface towards the gutters or water-tables. The drainage of the road has already been completed, the gullies built, and the grates fixed at the proper levels, and care must be taken in metalling the road to allow proper inclinations in the water-tables to the grates, and to fill up so that the said grates may stand at the level of the finished surface of the said water-tables.

A convexity of 6 inches to be given to the cross-section of the road according to the drawings.

Any additional work required to be done in order to render the street complete, and which shall be extra to what is shown on the plans and sections, or referred to in these particulars, to be allowed to the contractor at the schedule rate of prices annexed, and at which rates the contractor hereby agrees to perform and execute any such extra works which may be required by the surveyor for the proper completion of the said street.

The whole to be finished in a proper and workmanlike manner, and in every respect to the entire satisfac-

tion of , the surveyor, on or before the day of , now next ensuing.

One half the sum agreed to be paid for the said works shall be paid into the hands of the contractor on his producing a certificate signed by the said surveyor, certifying that 75*l.* per cent. of the whole value of the work has been satisfactorily completed; and the other half three months after the whole works have been delivered up as complete, on the contractor producing a like certificate from the surveyor certifying that the whole works have been completed in a perfectly satisfactory manner.

In case of non-completion of the works by the time and in the manner set forth in this specification, the contractor shall be subject to a fine of 30*l.* per week, or at that rate for any time that shall elapse before the completion of the works beyond the time specified. The said amount of fine to be deducted from the amount of the contract money as and for liquidated damages.

Schedule above referred to.

	£	s.	d.
Paving or pitching at per ton			
Curbing, with squared stone to footpaths, at per ton			
Metalling at per yard cube			
Top dressing at per yard cube			
Gravel for footpaths at per yard cube			
Hoggin, or top dressing to footpaths, at per yard cube .			
Excavating, levelling, and forming surface before paving, at per yard cube			

VII.—*Specification for* FENCING *to be done round . Crescent, also the triangular piece at the Junction of Road with Road, and that at the Junction of Street with . Road. For , under the superintendence of their Surveyor, .*

The posts to be sawn square above the ground, to be seven feet in length, and to stand above the ground surface four feet. The size of the posts to be 5″ by 5″ above ground, the butt-end being buried.

The posts to be of English oak, not more than eight feet asunder, and placed at regular intervals excepting round the curves, where they are not to be more than five feet apart, so as to preserve the true radius at the angles according to the drawing. The top of the posts to be sawn out V shaped to receive the top rail, which is to be fixed diagonally, being 4″ × 4″; the posts are also to be mortised in two places to receive the rails, which are to be of clean Memel, $3\frac{1}{2}'' \times 2\frac{1}{4}''$.

Straps of strong hoop-iron to be securely nailed across the heads of the posts embracing the rails, and passing down the posts on each side at least 18″.

The whole of the work to be kept level at top in true line or curve, as the case may be; all the materials to be of the very best quality, and, after being truly sawn, to be wrought smooth with a plane. The rails to be let carefully into the mortises, and secured with oak pins; both the pins and ends of the rails to be well smeared with white lead and oil.

The whole of the woodwork to be four times painted white with the best oil colour, and the straps at the top of the posts to be painted black.

Where the top rail is joined it must be by butt joints

and over the posts, and to such posts two *iron-hoop* straps to be used.

The contractor to provide, convey, and fix all the materials, and must complete the whole work on or before the day of , one thousand eight hundred and .

The contractor shall not be paid for any portion of the work until he has completed it to the entire satisfaction of the surveyor, but on the surveyor being satisfied, and a certificate given by him to the contractor, the amount of the contract shall be paid immediately by the said .

VIII.—*Specification of Work to be done in erecting and completely finishing feet run of* GARDEN WALL *adjoining Street, , at the place marked on the Plan, according to the Drawings prepared for that purpose, and hereto attached.*

Excavate the ground to the requisite depth to obtain a permanently solid and unyielding footing for the walling, and level and consolidate the bottom of the trench for the reception of the intended walling.

Build the walls with native stone, in random courses with through stones, which shall not be more than 18 inches apart in any direction; the work to be well flushed up with mortar in the joints 6 inches at least from the faces of the wall on both sides, the interior of the wall being grouted with liquid mortar.

Insert a plinth of stone 3 inches in thickness and 7 inches wide, chamfered according to the drawings, chisel-dressed on the face, and set perfectly

level from ramp to ramp. The copings and ramps in the coping to be moulded and wrought according to the drawings in stone, securely joggled at the joints, and set in cement.

The steps and gate-piers to be of stone, the latter moulded and wrought as shown in the drawings, and of the full thickness, height, and substance therein shown.

The random stonework of the wall to be set so as to present as level and fair outside face as possible.

Provide and fix a 2-inch bead and butt deal door, moulded on the top and panelled with three panels, semicircular at top; fit the door with closing knob of brass in a brass-sunk plate, with latch fastener at back and strong iron catch let into stonework. The door to be bound with neat wrought-iron hooks and bands, the hooks to be corked at the ends, and securely let into the stonework, and run with lead; the bands to be screwed to the gate with strong square-headed screws. The bands to be neatly wrought, and 18 inches each in length.

Properly prime and four times paint in the best oil colour the door, and finish the same by graining in imitation of oak; the ironwork to be painted black, and, when the painting is finished and dry, the whole to be well varnished three times over.

The whole of the work to be performed in a workmanlike and proper manner, the contractor providing all tackle, materials, and labour.

The mortar to be composed of lime, in the proportion of $\frac{1}{3}$ lime and $\frac{2}{3}$ sand, well mixed and incorporated.

The amount of the contract to be paid on the completion of the work in a manner satisfactory to the surveyor.

IX.—*Specification of Works to be performed in constructing a* BRICK SEWER *and* PIPE SEWERS *for the British Land Company, Limited, at Bow-road, in the Parish of Bromley, Middlesex, within the District of the Poplar Board of Works.*

The sewer is to commence at the point marked A on the plans, and to be continued along Bow-road to the point marked B on the plans, being a length of 153 yards, and having an inclination from B to A of 1 foot to 237.

The contract comprehends the following works*—viz. the making of such temporary fences as may be necessary during the progress of the works; providing for the lighting and watching of the same; making the necessary excavations to the depth shown on the section; the making and completing of the sewer, and junctions, and ventilating necks, according to the terms and conditions hereinafter mentioned; forming side entrance, filling in the earth to the necessary height over the sewer when built; reinstating the foot and carriage-way, pavements, or ballasted roads, and making good the gas and water-pipes, and every other matter or thing that may have been damaged, disturbed, or removed during the progress or in consequence of the works; the inserting into the new sewer of all existing drains, gullies, and shoots situate on either side of the same; pumping out the water which may arise during the excavation; forming all necessary dams or other works necessary for keeping the line of the new sewer clear from water during its progress; the making and maintaining of temporary bridges of planks for the accommodation of the public; the carting away of all superfluous rubbish and materials where and as shall be directed; the providing and

* See Figs. 2 to 8, inclusive, Plate 7.

affixing of such strutting and shoring as may be necessary and required, as well for the due execution of the works as for the protection of the public and the adjacent buildings, areas, walls, rails, cisterns, pipes for gas and water in the line of the sewer, or near to the works; including the finding and the providing of all cartage, implements, labour, timber, bricks, lime, sand, stone, cement, pipes, iron, lead, and other materials necessary for the completion of the works.

No allowance will be made to the contractor in respect of any extra works unless ordered by the surveyor, in writing, unless a correct account or voucher of the said work is delivered to the surveyor within three days from its completion.

Should it be deemed necessary at any time to suspend the works on account of the weather, or any other cause, the surveyor shall be at full liberty to do so, and no extra charge shall be made on this account by the contractor. In case of any gravel being found in the excavations, the same to be reserved for the use of the proprietors, and be carted on such portions of the estate as the surveyor shall direct.

EXCAVATION.

The ground to be opened to the necessary width and depth for building the sewer in such lengths at one time as the surveyor shall direct, and as each length is opened the sides of the excavation shall be supported and kept open by suitable timber, so as to prevent the ground from slipping in, until the whole of the brickwork is completed in each length; the foundation for the reception of the invert shall be cut out to the exact form and depth required, before any of the brickwork is laid, and should any irregularity be found to exist it must be made up with clay or clean gravel firmly

rammed in the vacant space, if any, between the side walls of the sewer, and the sides of the excavation shall be filled with clay or earth, such as the surveyor approves, and shall be rammed in solid with proper beaters, so as to prevent any distortion of the form of the sewer, and after the arch of the sewer is turned over; the open space shall then be filled to the original height of the surface, with layers of approved earth not more than 9 inches in thickness, each of which shall be carefully punned before laying on the succeeding layer, two men being employed in punning to one man filling in, and so in proportion for any number of men, immediately after which the pavement and ballasted roads shall be reinstated by the contractor.

All the superfluous earth and rubbish arising from the works shall be carted away with all convenient speed, as shall be directed from time to time, and the utmost accommodation afforded for the passage of the public, by keeping such portions of the footways and roadways clear from obstruction, as the surveyor may direct. Should any clay be dug up from the excavation, so much of it as will form two layers of 9 inches thickness each shall be laid next to the arch of the sewer, and well rammed down.

The digging for the junctions of the sewers, as shown on the plans and in the sections, to be performed in a manner similar to that above described.

The contractor will be required to open and excavate the trench for the sewer through its whole length. And he will not be allowed to tunnel any part thereof.

BRICKWORK.

The sewer is to be built in brickwork of the form shown in the detail drawings, with Jenning's patent invert blocks.

The side entrance to be formed in the said sewer in the situation indicated on the plans, and formed as shown in the detail drawings of side entrance. The ventilating necks to be erected where shown on the plan and section, and in the form and manner indicated by the working drawing of ventilating neck.

The contractor to provide and fix cast-iron ventilating grates, gully-mouths, and wrought-iron flap and safety gratings to side entrance, and foot-irons to same. To fit such ironwork to the brickwork as the sewer proceeds, and as may be directed, to provide and fix also the safety gratings over side entrance.

The new sewer is to communicate with the existing sewer at the point marked A on the plans, the junction with which is to be formed, as directed, with brickwork in cement, in the most workmanlike manner, and all damage thereby done to the brickwork of such now existing sewer made good.

The end of the sewer at B to be built up with 9-inch brickwork, laid in cement as directed, or in any other way, or with any other material approved by the surveyor.

A neck of brickwork is to be built at each of the points where there is a side entrance (or a junction with another sewer), to within one foot of the surface of the ground, the top four courses, in cement, to receive a ventilating grate; each neck is to be formed in manner as shown by the sections, from the side walls of the sewer, and to be one brick, or 9 inches substance all round.

The gullyholes are to be formed in the manner shown by the drawings of a gully, and of the depths and dimensions stated thereon; the grates to be well bedded and fixed.

The position for the gullyholes and ventilating necks are particularly marked on the plans and sections.

The walls of the side-entrance archway, and other portions, to be built in brick set in cement. The angle irons to be securely fixed in the brickwork, and the York flagstone steps to be bedded in cement.

The flap and safety grate to be of wrought iron, with frame, to be securely fixed and fitted with proper key, &c.

The pipe sewers in British Road and Merchant Road to be properly connected with the brick sewer.

All the bricks used in the works to be new, sound, well-burnt, and well-shaped grey stocks, or marl paviors, set in cement.

The cement to be used in these works to be of the very best quality, fresh, and to be mixed with an equal quantity of worked and approved Thames sand, procured above London Bridge.

The cement to be mixed in small quantities, as required; none of it being employed which has once become hard.

The whole of the brickwork to be set in cement throughout the entire work.

The joints in the brickwork must be well filled with cement; no joint to exceed quarter of an inch in thickness; no bats or small portions of bricks to be used; and, where closers are necessary, they must be cut of the largest size possible to fit the opening. The brickwork to be properly bonded, and the horizontal courses kept perfectly straight in the direction of the sewer, and parallel with the rise of the same.

At any time, should the regular continuity of the arch or sides be destroyed, either from irregular shrinking of the arch, or from the centres being improperly fixed, or from any other cause whatsoever, the contractor must remove such portions, and amend the irregularities in a satisfactory manner.

The contractor is to provide three lengths of wooden framework, called "centering," each of 12 feet in length, formed of the size of the internal part of the arch of the sewer; and which lengths are always to be set as each portion of the sewer proceeds, one (viz. the back) length only to be removed at a time, as shall be directed, so that two lengths may always remain fixed, supporting the arch; and he is to provide such other centering and invert, or other turning pieces, as the surveyor may consider necessary during the progress of the works.

The contractor is to give such notices, both previous to and after the completion of the above works, as are required by Acts of Parliament relating to pavements, highways, or turnpike-roads, to be given to the surveyors or inspectors appointed under such acts; and also to the proper officers of the water and gas-light companies, whose pipes may be disturbed or damaged by reason of the works under this specification; and previous to payment being made of the last instalment payable under the contract, the contractor is to furnish and deliver to the proper officers certificates in writing that all such pavements, roads, highways, pipes, and mains which may have been disturbed or injured, have been repaired and made good, or the expense thereof paid by the contractor, and all demands in respect thereof defrayed by him.

The contractor is to be answerable and responsible for all accidents which may occur during the performance or in consequence of the works, and to take every precaution to guard against the same by shores, strutts, braces, boarding, &c.

After the completion of the sewer, in case the surveyor of the Poplar district shall require it for more perfect satisfaction, the contractor shall cause as many

openings, not exceeding four, to be made through the side walls, invert and back of sewer, as the surveyor shall direct, which openings the contractor, after examination has been made by the surveyor, shall make good again at his own expense in a satisfactory and workmanlike manner.

The works to be performed to the entire satisfaction of the surveyor to the Poplar District of the Board of Works under the Metropolitan Commissioners of Sewers, and to the satisfaction of the surveyor to the proprietors, or their duly authorised agents; where the new streets, British-street and Merchant-street, intersect the footpath, a space of paving with $6'' \times 6'' \times 3''$ Mount Sorrell stone, such as are used for street paving, must be laid transversely across the new streets of the full width, 10 feet, following the curved surface of the new roads, having granite pitched and properly-formed water-tables, both across the end of the roads adjoining Bow-road, and on each side the new streets, as far as the granite pitching extends, curb from the commencement of the pitching on both sides each road, to make good up to paling of footpath.

PIPE SEWERS IN BRITISH-ROAD, MERCHANT-ROAD, AND BACK ALLEY.

To dig out the ground to the required depth for the mains, and cross-drains, and cess-pits, and perform all other digging that may be required.

In digging the trenches for the drains, the contractor to excavate the trenches to be opened at least one foot wider than the diameter of the pipe intended to be laid. The bottom of the trench to be hollowed out to the exact form and size of the lower half of the pipe which will be imbedded in it; any irregularity in the trenches to be filled up with gravel or clay, firmly

rammed in, but where the ground would not present a sufficiently firm foundation for the pipe, the contractor to excavate to such increased depth as may be required or necessary, and shall make good to the required form and level with concrete

To fit up the trenches of the drain-pipes as follows: the soil on each side, and 6 inches over the pipes, to be carefully laid in so as not to disturb them, and solidly rammed down.

The trenches to be then filled with layers of earth, 12 inches deep at a time, each layer being well rammed over the whole surface.

The first layer to be placed over the pipes with a shovel and not from barrows; the pipes not to be walked upon until this is done.

To execute all the brickwork in Roman cement necessary to form all cess-pits for the gully shoots, with their inverts.

The bricks to be of good, sound, whole, hard, well-burned stocks, of uniform shape and size.

The Roman cement to be the very best, used fresh, and mixed with clean sharp sand, in equal proportions.

The pipes used to be those known as Jenning's Patent Saddle Pipes, 12 inches in diameter, the gully-shoots being $6\frac{1}{2}$-inch socket pipes of approved manufacture; each end opening into the drain to be trapped with a galvanised iron-mouth plate, properly hung.

Fit two flushing shafts where indicated on section, formed with 6-inch socket pipes bedded in concrete, connected at the lower end with the pipe sewers, and at the upper with the brick chamber for receiving same. Form brick chambers of 9-inch brickwork, and footings built in cement for flushing box; and fit thereto a strong cast-iron flushing box, with hinged flap and key complete.

Provide all junctions, curves, tapering lengths, &c., of the most approved kind.

The pipes to be laid truly in line, with true gradients throughout. To prevent the sand from getting into the pipes, the joints to be bound with a band of well-tempered clay.

The interior of the pipes to be carefully freed from all dirt or clay as the work proceeds.

To properly bed on the cess-pits, cast-iron gully gratings, and frames 1.6 × 1.6, in separate pieces; the grates to be made to open and fasten with cast iron catches, pinned to the grates with wrought-iron pins.

The line of pipes shall not be covered until they have been examined and approved of by the surveyor.

The greatest care to be taken to replace the broken brick, rubbish, and ballast in the roads in its original position when the drainage shall have been completed.

A.—This is the specification marked A referred to in the contract between and the , dated this 24th February, 1863.

The contract for this work was 452*l.* 15s. 10d., complete.

X.—*Specification of* Sewer Works *at Hastings.*

EXCAVATION.

The ground to be opened to the necessary width and depth for building the sewer in such lengths at one time as the surveyor shall direct, and as each length is opened the sides of the excavation shall be supported and kept open by suitable timber, so as to prevent the ground from slipping in until the whole of the brickwork is completed. In each length the foundation for the re-

PLAN OF CULLY.

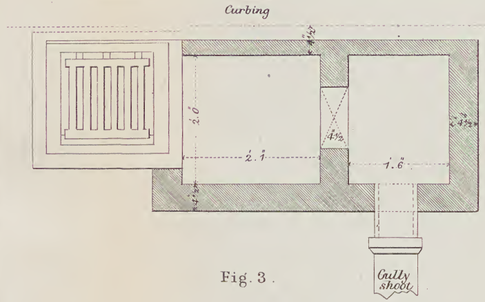


Fig. 3.

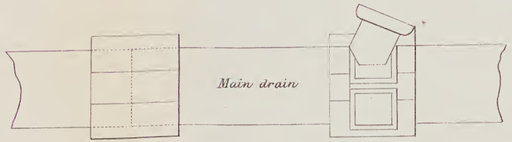


Fig. 2
SECTION OF SEWER.

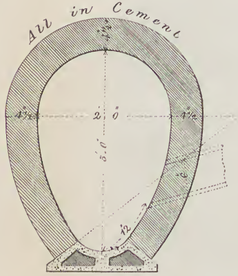


Fig. 4.
TRANSVERSE SECTION OF CULLY.

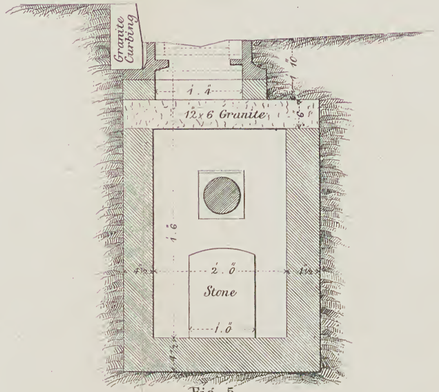


Fig. 5
LONGITUDINAL SECTION OF CULLY.

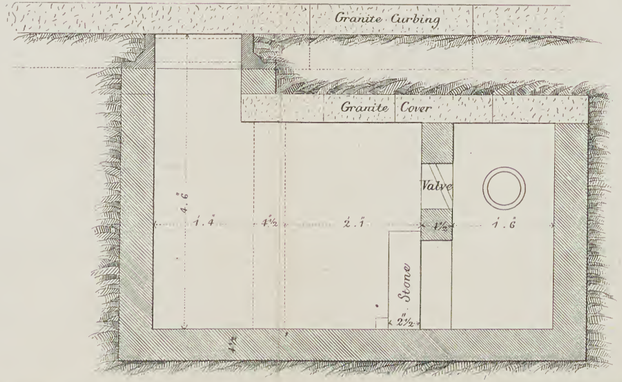
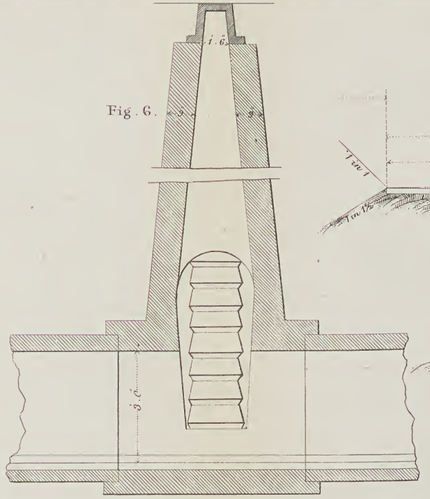


Fig. 6.



Sections of Side Entrance and Ventilating Shaft.

Fig. 7.

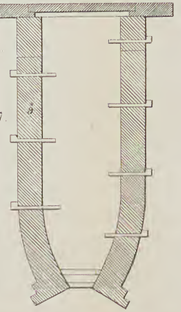


Fig. 1
CROSS SECTION OF ROAD.

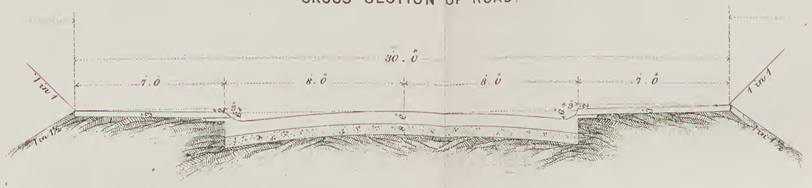
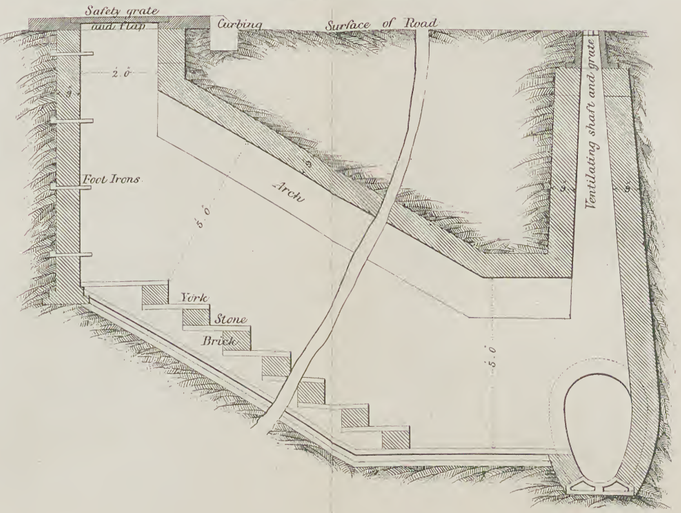


Fig. 8.
SIDE ENTRANCE TO SEWER.



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ception of the invert shall be cut out to the exact form and depth required before any of the brickwork is laid, and, should any irregularity be found to exist, it must be made up with clay or clean gravel firmly rammed in the vacant space; if any between the side walls of the sewer and the sides of the excavation shall be filled with clay or earth such as the surveyor approves, and shall be rammed in solid with proper beaters, so as to prevent any distortion of the form of the sewer, and after the arch of the sewer is turned over, the open space shall then be filled to the original height of the surface with layers of earth not more than nine inches in thickness, each of which shall be carefully punned before laying on the succeeding layer, two men being employed in punning to one man filling in, and so in proportion for any number of men.

All the superfluous earth and rubbish arising from the works shall be carted away with all convenient speed, as shall be directed from time to time; should any clay be dug up from the excavation, so much of it as will form layers of inches in thickness each shall be laid next to the arch of the sewer, and well rammed down.

The digging for the junctions of the sewers, as shown on the plans and in the sections, to be performed in a manner similar to that above described.

The contractor will be required to open and excavate the trench for the sewer through its whole length, and he will not be allowed to tunnel any part thereof.

BRICKWORK.

The sewer is to be built in brickwork of the form shown in the detail drawings.

The side entrance to be formed in the said sewer in

the situation indicated on the plans, and formed as shown in the detail drawings of side entrance.

Flap and safety gratings *will be provided*, but the foot irons the contractor must provide.

The contractor must properly bed and fix the safety gratings over the entrance to man-hole.

The new sewer is to communicate with the existing sewer at the point marked on the plans, the junction with which is to be formed as directed, with brickwork in cement, in the most workmanlike manner, and all damage thereby done to the brickwork of such now existing sewer made good.

The end of the sewer at to be built up with -inch brickwork laid in cement, as directed, or in any other way, or with any other material approved by the surveyor.

A neck of brickwork is to be built at the point where there is a side entrance (at the junction with the pipe-sewer) to within of the surface of the ground, the top courses in cement to receive a ventilating grate, to be provided by the contractor; the neck is to be formed in manner as shown by the sections from the side walls of the sewer, and to be brick or inches substance all round.

The walls of the side entrance, archway, and other portions to be built in brick set in cement, the angle-irons to be securely fixed in the brickwork, and the York flagstone bottom to be bedded in cement.

All the bricks used in the works to be new, sound, well-burnt, and well-shaped grey stocks, or marl paviors set in cement.

The cement to be used in these works to be of the very best quality, fresh, and to be mixed with an equal quantity of worked and approved sand.

The cement to be mixed in small quantities as re-

quired, none of it being employed which has once become hard.

The whole of the brickwork to be set in cement throughout the entire work.

The joints in the brickwork must be well filled with cement, no joint to exceed of an inch in thickness, no bats or small portions of bricks to be used, and, where closers are necessary, they must be cut of the largest size possible to fit the opening; the brickwork to be properly bonded, and the horizontal courses kept perfectly straight in the direction of the sewer, and parallel with the rise of the same.

At any time, should the regular continuity of the arch or sides be destroyed either from irregular shrinking of the arch, or from the centre being improperly fixed, or from any other cause whatsoever, the contractor must remove such portions, and amend the irregularities in a satisfactory manner.

The contractor is to provide two lengths of wooden framework called "centering," each of feet in length, formed of the size of the internal part of the arch of the sewer, and which lengths are always to be set as each portion of the sewer proceeds, one (viz.—the back) length only to be removed at a time, as shall be directed, so that two lengths may always remain fixed, supporting the arch; and he is to provide such other centering and invert, or other turning pieces, as the surveyor may consider necessary during the progress of the works.

The contractor is to give such notices, both previous to and after the completion of the above works, as are required by the local board to be given to the surveyors or inspectors appointed under such board.

The contractor is to be answerable and responsible for all accidents which may occur during the performance

or in consequence of the works, and to take every precaution to guard against the same by shores, strutts and braces, boarding, &c.

After the completion of the sewer, in case the surveyor of the district shall require it for more perfect satisfaction, the contractor shall cause as many openings, not exceeding two, to be made through the side walls, invert, and back of sewer, as the surveyor shall direct, which openings the contractor, after examination has been made by the surveyor, shall make good again at his own expense in a satisfactory and workmanlike manner.

The works to be performed to the entire satisfaction of the surveyor to the board.

The contract for this work, complete, was 257*l.*

SECTION II.—ARCHITECTURE.

I.—*Specification of Works to be performed for building a* Pair of Semi-detached Cottages *at Barnet, Herts, for the British Land Company, Limited, according to Drawings for that purpose provided, and the Specifications and Descriptions hereunder written.*

List of Drawings.

B. Drawing of ground and chamber floor.
C. Isometrical plan.
D. Longitudinal section.
E. Front elevation.
F. General details.

In all cases written dimensions to be taken in precedence of those scaled from the drawings, and dimensions stated in the specification to take precedence of dimensions given on plans and drawings. In cases where these specifications describe the work to be done in erecting one cottage, the same must be understood as applying equally to both houses being included in one contract, and in all respects similar one to another.

EXCAVATOR.

Dig out the ground to the depths required for the drains and the foundations of all the walls, and make level and solid the bottoms of the trenches for the reception of the intended brickwork. When the walls

have been built up to the level of the ground and the drains laid, fill in the remaining portions of the trenches solid and firm up to the level of the natural surface of the ground, and cart away and remove the superfluous rubbish and earth where directed by the surveyor.

DRAINAGE.

The drain-pipes to be of the best quality of well-burnt metallic earthenware, with all proper bends and junctions, to be well and carefully laid, and to be well-clayed at the joints, the junction with the main drain to be made by the company's workmen on the estate, under the inspection of Mr. J. Stokoe, clerk of works on the estate.

A 6-inch pipe drain to be laid from the water-closet to the main drain, a 3-inch pipe from the sink to same, all to be properly trapped before being connected with the main drain.

BRICKLAYER.

All the bricks used in the works to be of good quality, hard, sound, well-burnt and well-shaped, the face-bricks for the fronts to be white or yellow stocks, picked, of uniform colour. The bricks for the plinth quoins and window dressings to be the best red bricks, uniform in colour, chamfered red bricks being used round the windows, as shown in annexed sketch.

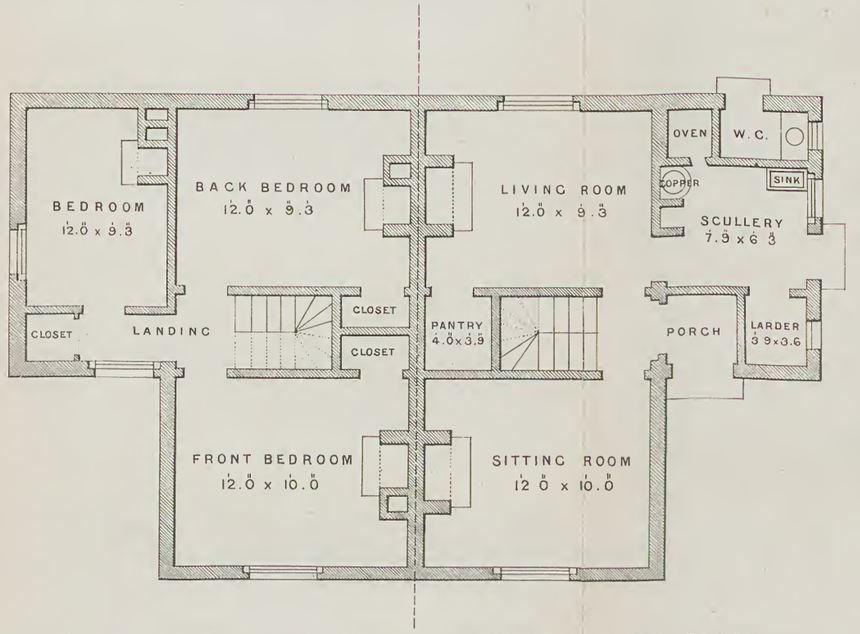
The top course for the plinth to be of chamfered bricks, as follows :

Under the level of the floors all the walls to be covered with a coat of asphalte to prevent the damp from rising. All the rooms on the ground-floor, including porch and water-closet, with the exception of the front sitting-room, to be paved with 9-inch square paving tiles bedded upon 15 inches in thickness of broken brick

COTTAGES AT BARNET.



FRONT ELEVATION.



PLAN OF BEDROOM FLOOR. PLAN OF GROUND FLOOR.

SCALE OF FEET.



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rubbish, well consolidated, and made perfectly level at top, a coat of mortar is then to be spread on as the tiles are laid, and after firmly bedding and completing the floors, they must be floated with liquid mortar to fill up all interstices.

The brickwork to be carried up in Flemish bond, according to the drawings, and of the full thickness indicated thereon.

Tenders of $4\frac{1}{2}$ brick in mortar and 9-inch footings to be built for carrying hearth-stones to ground-floor, and dwarf walls of the same thickness, and with similar footings for carrying sleepers to front sitting-room floors.

All the joints of the brickwork to be drawn perfectly straight, and neatly flat-pointed to all external walls, the vertical joints to outside walls to be perfectly perpendicular to the horizontal joints from top to bottom of the building, and near the quoins and at the sides of windows and doors closers and $\frac{1}{2}$ or $\frac{3}{4}$-bricks to be used to preserve the true uniformity of the bond. One tier of bond-timber 4×3 to be inserted in all the walls halfway between the grounds-floor and ceiling, and halfway between the bedroom-floor and ceiling, in addition to which wall-plates 4×3 to be put under the joists both for the bedroom-floor and for carrying the ceiling joists.

The mortar to be composed of $\frac{2}{3}$ by measure of clean sharp sand and $\frac{1}{3}$ of well-burnt Hitchin lime, well mixed and incorporated. The mortar to be used as stiff as it conveniently can be.

Wood-bricks to be inserted wherever requisite for fixing door-linings, skirtings, &c., and all lintels and templets to be inserted and well bedded in mortar, as well as pole-plates and all iron and stonework requisite and necessary to be set in the brickwork.

All cement to be of the best quality, mixed with equal portions of sand, and no more must be prepared at a time than can be immediately used.

Provide all scaffolding and requisite tackle for the proper performance of the whole of the works.

Properly turn parget and core all the chimney flues, and finish the chimney shafts above the roof, as shown in the drawings, with white or yellow bricks, to correspond with the front brickwork, and with salient course 5 inches high of red brick of the kind used for quoins and dressings.

The sinks' stones to be supported with $4\frac{1}{2}$ brick walls.

The copper, with proper ash-pit and grate, with flue fitted with damper, to be done in brickwork in the best manner, the top to be covered with a coating of cement.

Build the brick oven in the best manner upon a properly formed core of sand, the arched top and sides to be of brickwork set endways, and in no case less than 9 inches in thickness.

Provide proper iron door with iron frame and fastener, and a furnace-hole for ashes underneath, a proper hood to be built in front to carry off the products of combustion by a flue connected therewith into the nearest chimney, the floor of the oven to be of good flat brick laid very close in mortar.

Provide all centering and turning pieces and counter arches over all the internal and external door and window openings.

Put proper trimmer arches to all the chimney openings, with chimney bars $\frac{1}{2} \times 1\frac{3}{4}$ of wrought iron properly turned and corked at the ends.

Jenning's air-bricks to be put in in sufficient numbers to allow of the circulation of air between the ceilings and floor joists.

Provide and fix in each house a 20-gallon set pot of cast iron, with furnace-door, frame, and damper complete.

Light to be given to water-closet, pantry, and external closets up-stairs by Jenning's ornamental, large-sized, ventilating tiles, which will be provided by the company, and the water-closet basin, trap, &c.

STONEMASON.

Provide to the kitchen a rubbed York stone chimney-shelf, rounded at the angles, set in the brickwork, and projecting 9 inches from the face of the wall.

Put to the front sitting-room marble chimney-pieces of the value of 1*l.* 12s. each; to the back sitting-room and front bedroom rubbed stone chimney-pieces, 25s. each; to the other bedrooms chimney-pieces of rubbed stone, 15s. each, cost price in the yard, to be selected and approved by the surveyor.

Put rubbed York hearthstones and back hearths to all the fireplaces up and down stairs, rubbed York steps to front, back, and water-closet doors, bedded on brickwork or dry lime rubbish.

Put wrought, weathered, throated, and sunk stone window-sills to all the windows throughout the building.

Put in each pantry a slate slab 16 inches wide, $1\frac{1}{4}$ thick, and in length exceeding the full width of the pantry by 3 inches, so that it can be let into and firmly rest in the walls at the ends.

CARPENTER.

All the timber to be used in the building to be sound, well-seasoned Baltic, listed, free from large dead knots, wany edges, shakes, sap, and other defects.

Sound yellow deal battens may be used for the carpenters' work of small scantling; all the oak used must be of the best English growth.

All the floors not paved of the ground-floors to be laid with $1\frac{1}{4} \times 7$ yellow deal boards, planed and laid folding, and securely nailed to the joists.

The ground-floor joists to be $4\frac{1}{2} \times 2\frac{3}{4}$, laid and notched on oak sleepers 4×3; the oak sleepers to rest on dwarf walls, which must not be more than 5 feet apart from centre to centre.

Trimmers to be put to hearth fronts, mortised into trimming joists, to be $\frac{1}{4}$-inch thicker than common joists; mitred margins 3 inches wide to be put round hearthstones, both up-stairs and down, to all the chimney places.

All the joists for the chamber floors to be 9×2, resting on wall plates $4\frac{1}{2} \times 3$.

Trimmers and trimming joists, 9×3; floor-boards to be of same description, and securely nailed in the same manner as those for the ground-floor; a tier of herring-bone strutting to be put between the joists in the middle line of each floor.

No joists, rafters, or quarters in any part of the buildings to be more, respectively, than 15 inches apart from centre to centre.

A tier of bond-timber, properly halved and spiked at the ends, $4\frac{1}{2} \times 3$, to be put throughout all the walls midway between the ground-floor and the ceilings of the lower rooms, and midway between the floor and ceilings of the bedrooms; wall-plates 4×3 to be inserted in the walls for the joists of each floor and for the ceiling joists to rest upon; and all the joists must be securely notched upon, and nailed thereto.

The ceiling joists to be $2\frac{1}{4} \times 2\frac{3}{4}$, securely nailed upon wall-plates.

Pole-plates 4×4 to be bedded on all the external walls for carrying the rafters of the roof.

The roofs to be formed with rafters, purlins, couples, and ridge-pieces, the purlins to be placed midway between the eaves and the ridge to all the roofs, the ends resting upon the outer walls and projecting to carry the overhanging roofs, and for securing the barge boards; the pole-plates and ridge-pieces to project in the same manner and for the same purpose; the coupling-pieces, 8 in number, to be $8 \times 1\frac{1}{2}$, securely nailed to the rafters, and the rafters to which the coupling-pieces are nailed to be an inch deeper and an inch thicker than the common rafters. The common rafters to be $3 \times 2\frac{1}{4}$, purlins $5\frac{1}{4} \times 3$, pole-plates 4×3, ridge-pieces 6×2, with three-quarter round ridge-rolls nailed on the top $2\frac{1}{4}$ inches in diameter.

The barge boards to be formed of planed stuff chamfered at lower front edge, 6×2, securely fixed to ridge-pieces, purlins, and pole-plates with $2\frac{1}{2}$-inch ogee moulding under slates, barge boards, and mouldings, to be put both to the front and side gables. The finial to front gable to be formed of planed and wrought 3-inch stuff, securely fixed.

Put rough cradling formed of 2-inch stuff under projecting roofs, for carrying the lath and plaster thereto.

Provide all requisite wood, bricks, and plugs for door linings, skirtings, and all internal fittings, and put $1\frac{1}{4}$-inch square staves to all the projecting internal angles, to chimney-breasts, and any other projection.

Skirt all the rooms up-stairs and down with planed and top-edge chamfered inch skirting-boards 8 inches high, securely nailed to plugs inserted in walls.

Provide and fix strong bearers for water-closet seats, for carrying cisterns, and for any other works requiring same.

Provide trap-door in ceiling near cistern, for examining same when necessary, formed of $\frac{3}{4}$ stuff planed, and strong back battens, hinges, fastener, and planed and beaded margins, securely fixed to ceiling joists with requisite trimmers and all necessary woodwork.

Provide planed inch riser and $1\frac{1}{2}$ inch rounded seat to water-closet, with chamfered hole and lid with handle to fit.

Put to pantry two rows of shelves on one side and end, of planed inch deal 12 inches wide, with rounded edges, securely fixed on strong fir wall-brackets

The stairs to have turned and wrought starting and newel posts, 3×3 deal rounded handrail planed, and inch square planed balusters, 2 to each step; the stairs to be formed with planed inch risers and one inch planed and rounded steps, blocked and glued with $9 \times 1\frac{1}{2}$ moulded wall string, and $1\frac{1}{2}$ moulded and planed string; at other end of steps the steps to be securely housed into the strings at both ends, and framed complete before fixing.

Fit up in back living-room a dresser, as shown on plan, securely fixed by brackets to wall, formed with inch planed deal top, and fitted with two drawers, with proper hard-wood runners and wood handles, foot-board, and three tiers of shelves for crockery, with ledges and stiles complete.

Put three tiers of shelves to closet up-stairs, inch thick and 12 inches wide, planed, and to be rounded at front edge, and fixed on strong wrought wood brackets let into walls.

The quartered partitions up-stairs to be formed with heads and sills 3×3, jambs for doors 3×3, common quarters $2\frac{1}{4} \times 2\frac{1}{4}$, strutts and ties $2\frac{1}{2} \times 3$.

SLATER.

The roofs to be covered with Bangor Countess slates, to be picked with well dressed edges and of uniform colour, no slips or small pieces to be used at the eaves for the purpose of making bond, each slate to be securely nailed with two composition nails to the slate battens, the slates to overlap at least three inches.

Provide and nail to rafters properly gauged for slates slate battens $1\frac{3}{4} \times 1$ full, and provide inch boards for gutters, securely fixed upon bearers $2\frac{1}{2} \times 1\frac{1}{2}$ nailed to rafters, the gutter-boards to be 9 inches wide and 1 inch thick, feathered at the edges.

Cover the ridges with blue roll ridge-tiles of colour to match the slates, bedded in cement, and secured at the ends with strong wrought L irons.

PLUMBER.

Flash round the chimneys with lead 5 pounds to the foot super, firmly secured with iron dog-nails into brick work, and bent under slate at least 8 inches.

Lay the valleys with lead 5 pounds to the foot super, urned under slates on each side at least 10 inches.

Lay on the water from the cisterns to the kitchen-sink with $\frac{3}{4}$-inch lead pipe, fitted with proper brass bib tap over sink, lay a pipe from said pipe to cistern filling water in kitchen, and provide proper copper ball-cock and fittings complete.

Fit up in scullery a galvanised iron sink, with bell-trap and a waste-pipe therefrom to outside, and by drain to sewer.

Fit up in each house a cast-iron tank or cistern, by Messrs. Burney and Bellamy, to hold 80 gallons, 4 feet by 2 feet, by 1 foot 8 inches; fit up a service-pipe therefrom to water-closet, and another to sink, with branch

therefrom, as specified to boiler. Lay on the water from the company's main by inch pipe, to be fitted in cistern with copper ball-cock complete. The cisterns to be in roofs of houses over the small bedrooms.

Fit up to each house a Jenning's patent water-closet, with white earthenware basin and trap complete, iron waste-pipe therefrom to drain leading to main sewer.

JOINER.

The woodwork for the internal fittings to be of American red pine, clear, sound, and well seasoned. The front and back doors to have planed, chamfered, and rebated 3×3 solid frames; the front door-frame to have top style for fanlight, the fanlight to be glazed with Newcastle best ground glass.

The front door to be four panel square-framed bead and flush $1\frac{1}{2}$ inch door, hung with two $3\frac{1}{2}$-inch iron butt hinges, with two 10-inch iron barrel bolts, and 9-inch strong iron-rimmed spring lock and brass furniture; the back door to be inch-beaded batten door, with three strong chamfered $6 \times 1\frac{1}{4}$ battens at back, hung with two strong iron T hinges, fitted with Norfolk thumb latch and two strong 10-inch iron barrel bolts. Water-closet to have 3×2 beaded solid frame and inch batten door, hung with two cross garnet hinges, fitted with Norfolk thumb latch and small inside iron socket bolt.

All the other down-stair doors to have $1\frac{1}{2}$-inch deal cases rebated and beaded, and four panel square-framed $1\frac{1}{2}$-inch doors, hung each with two 3-inch iron butt hinges, and each fitted with 6-inch iron-rimmed spring lock and brass furniture.

All the up-stair doors to have $1\frac{1}{2}$-inch planed rebated and beaded door cases, and $1\frac{1}{4}$-inch four panel square-framed doors, hung each with two 3-inch iron

butt hinges, and 8-inch iron-rimmed spring locks and brass furniture.

All the windows to have 3×3 rebated and planed, outside chamfered, and inside beaded, solid frames, with centre chamfered, rebated, and beaded mullions, $1\frac{1}{2}$-inch moulded sashes, half fixed and half to open, the open part to be fitted with iron folding regulating bar, hinged and fixed pin, and hung with two 3-inch iron butt hinges, and fitted with spring fastener.

Each window to have oak sunk and ledged sill, and inch planed and rounded window board inside.

PLASTERER.

The quarter partitions in the bedroom floor to be lathed, plastered, and set.

The walls throughout to be rendered floated and set, except the scullery, larder, pantry, and water-closet, which are to be twice coloured in distemper.

The ceilings throughout to be lathed, plastered, set, and whitened, excepting the scullery, water-closet, pantry, and larder, which may be lathed, floated, and set.

The walls to coal-place under stairs, to be lime whitened. Lath to cradling under projecting roofs, and render plaster and set same.

IRON-FOUNDER.

Fix up in the kitchen a 20-gallon iron set pot, with damper, furnace, and door complete.

Provide iron-door frame, fastener, &c., to brick oven, as specified under the head of brickwork.

Fit up in scullery a neat furnace, with front and back irons and hobs.

Fit up in back living room a proper kitchen range, with oven and self-filling boiler, with safety-tube and

ball-cock, and galvanised iron cistern complete; lay on water to same by ¾-inch lead pipe from water service.

Fit up in front parlour a neat register stove-grate, of the value of 35s. cost price in shop.

Fit up in front and back bedrooms register grates, of the value of 30s. each; and to the small bedroom over kitchen a grate, with fronts, backs, and sides complete, value 18s. The kitchen and other grates and ranges to be selected by the surveyor at price fixed by him at the time.

GLAZIER.

All the windows to be glazed with best Newcastle crown glass, properly bedded, bradded, and back puttied.

PAINTER.

Stop knot and paint three times in the best oil colour all the external and internal wood and iron-work usually painted; the external doors and windows to be oak-grained and twice varnished, and the internal work to have last coat of tint approved by surveyor.

PAPER-HANGER.

The walls to be papered, when required by the surveyor, with papers to be approved by him, and selected by him for the down-stair rooms, not exceeding 1½d. per yard, and upstairs 1d. per yard.

This is the specification marked A referred to in my contract with the British Land Company (Limited), dated this eleventh July, one thousand eight hundred and sixty-three.

The contract for this pair of cottages was 325*l.* complete.

II.—*Specification of Works required to be done in erecting and completely finishing a* PAIR OF SEMI-DETACHED COTTAGES *at Maidstone for the*
according to Drawings, of which the following is the list:

List of Working Drawings.

Drawing containing basement plan, ground plan, and chamber or first floor plan, marked B.

Front and back elevation of the two cottages, marked C.

Longitudinal sections, marked D.

Transverse sections, marked E.

General plan to small scale of drainage.

Details, marked F.

In all cases dimensions that are written to be taken before dimensions that are scaled, and dimensions written in the specification to be taken before dimensions marked on drawings.

EXCAVATOR.

Excavate the ground to the depths required for the foundations of the walls, cellars, and areas. The bottom of the trenches to be rammed down and made perfectly solid and firm, the levels to be properly preserved, and in cases requiring the levels to be made up, with well-rammed earth taken from the superfluous earth.

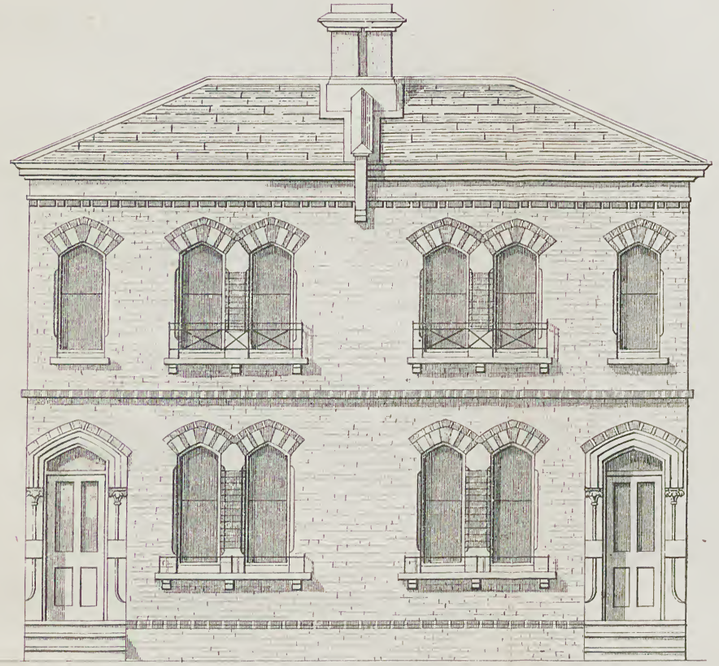
Excavate for the drains and cesspools in the lines and positions marked on the general plan. The drains to be laid with proper inclinations of at least $\frac{1}{2}$ an inch to 1 foot. The pipes to be of the best quality of metallic earthenware, and no bent, misshapen, or bad pipes to be used. The joints to be made with well-tempered clay, syphon-traps to be used beneath the closets,

and all drains to be trapped before entering the cesspool. The sizes of the pipes are marked on the general plan, the figures representing the internal diameter, the thickness of the pipes to be $\frac{1}{12}$ of the diameter thereof. The drains to be laid and left uncovered until they have been inspected and approved by the surveyor. The soil to be carefully thrown into the trench upon the pipes, and as it is filled in to be well rammed and consolidated, care being taken not to disturb or misplace any of the pipes; the trenches to be filled and consolidated up to the level of the adjoining ground. After the walls of the buildings have been raised a sufficient height to admit thereof, fill in the trenches up to the walls to the level of the ground, ramming and making solid the same as the work proceeds.

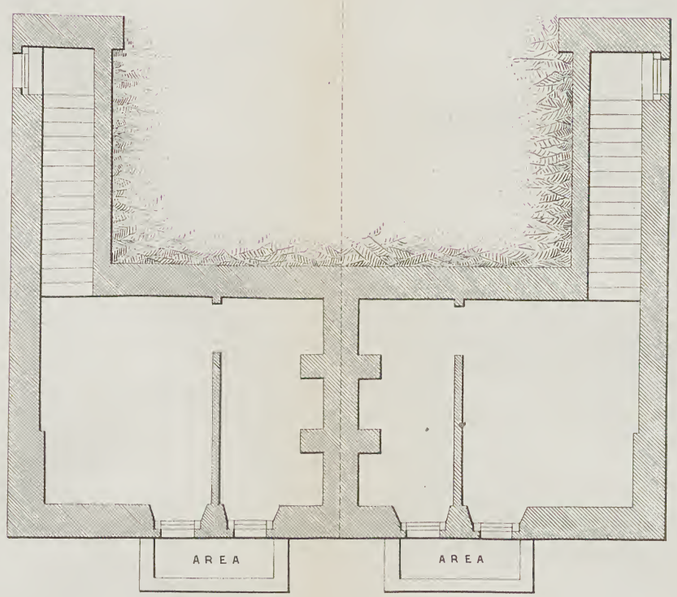
Each house to be provided with a cesspool, as indicated on the general plan.

Each cesspool to be 6 feet 6 inches deep and 3 feet under the surface, making the total depth of the cesspool from the surface 9 feet 6 inches; to be 5 feet in diameter, paved with bricks laid flat in liquid mortar upon sand at the bottom, and steined round with 9-inch brickwork laid dry and close, excepting the four top courses under the dome, which are to be laid in mortar with the joints well flushed up, the top course being of level bricks laid edgeways for springing the dome from. The top of each cesspool to be domed over in 4½-inch brickwork set in mortar, with a man-hole in the centre 2 feet in diameter, the bricks round the man-hole to be set in cement. The man-hole to be covered with a 3-inch York flagstone, fitted with a strong iron ring run into the stone with lead for removing same when necessary for cleansing out the cesspools. The drains to be trapped before entering, and let in flush with the inside of the brickwork, and at least 4 feet 6 inches from the

HOUSES AT MAIDSTONE.



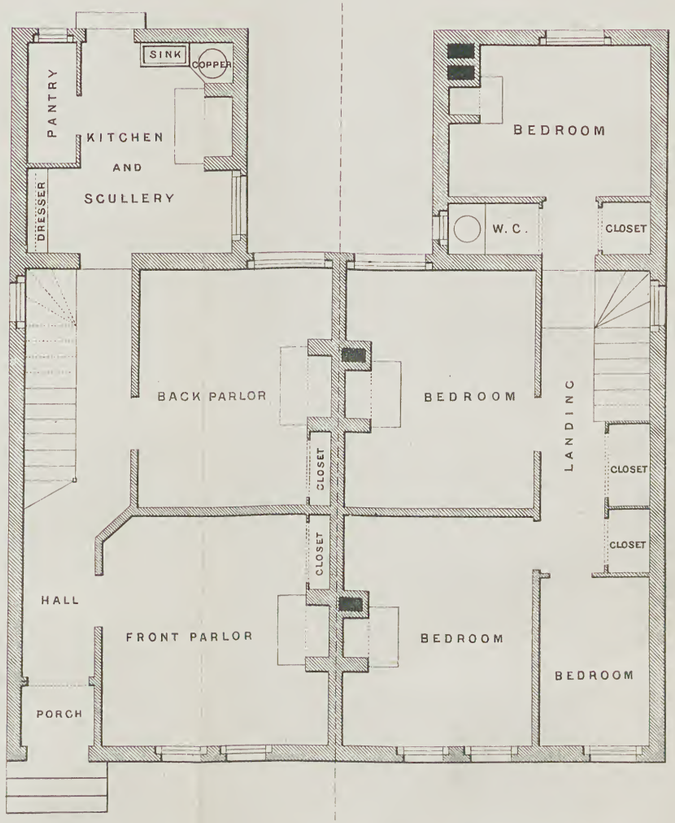
ELEVATION.



PLAN OF CELLARS.

SCALE OF FEET.

10 9 8 7 6 5 4 3 2 1 0 10 20



PLAN OF GROUND FLOOR. PLAN OF BEDROOM FLOOR.

E. & F. N. Spon, 16, Bucklersbury, London.

bottom of the cesspools; the dome to raise at least $\frac{1}{3}$ of the diameter of the cesspool when the cesspools are complete, the ground to be filled in at top perfectly firm and solid, and level with the ground adjoining.

Excavate for the front boundary wall, and in all respects observe the conditions as to excavating and filling the trenches already specified.

Perform all works of the nature of excavator's work that may be required to render the works complete, although the same be not particularly specified.

BRICKLAYER.

The brickwork to include all bedding and fixing of wall-plates, templets, brackets, wood-bricks, and plugs, also the bedding and fixing of all stonework and ironwork to be set or fixed in the brickwork, the fixing of coppers, stoves, and grates, and all cutting for pipes, or other work connected with other trades.

The bricklayer must also provide sufficient safe standing scaffolding, to be left standing until all the buildings are completed in every respect, and to provide all tools, tackle, ladders, ropes, derricks, planks, blocks, putlogs, and all other requisite tackle and material. The bricklayer to provide all materials and labour of the best quality of the respective kinds to be used in the works.

The brickwork to be done in Flemish bond, with the joints well flushed up and neatly flat pointed outside; the joints to be drawn perfectly straight and true, and the closers to be so arranged that all the vertical joints from bottom to top shall be in true, straight, and perpendicular lines. No four courses of brickwork to rise more than 1 foot, including the mortar joints; no burrs, clinkers, misshapen-place, cracked, or stony bricks will be allowed to be used, but all must be hard, sound,

square, and well burned and well shaped, of their respective kinds.

All the bricks for the front to be picked of uniform size and colour, except the coloured bricks, which will be specified; all the front brickwork to be carried up with the best yellow stock bricks, the same applying to the front boundary walls; clean, well-shaped, punched, machine-made bricks may be used, if as cheap and convenient to be procured. The plinths, strings, and cornices to be executed in the best red bricks, as shown in the drawings, the piers to the front windows being carried up in chamfer and stop chamfer bricks of the same colour and quality.

The arches to the front windows to be of the shape and colour indicated on the drawings, gauged, rubbed, and properly and truly set in prepared putty. A course of black brick on edge to be put over the whole of the front arched openings, conforming in shape to the arches, and a course of the same kind under the string-course to the main cornice. All other external openings to be arched in good sound bricks of the same colour as the walls in two rims of $4\frac{1}{2}$ inches each, having a rise of at least $\frac{1}{6}$ of the span.

Throw counter-arches over all internal openings; no flat or French arches will be allowed in any part of the work.

Provide proper turning-pieces and centres for all arched openings; provide all labour in rubbing and cleaning chamfers, &c., to front brickwork that may be required.

The side, back, and internal walls to be carried up in good, sound, stock bricks; the colour of the bricks for external work to be uniform.

Put brick fender and sleeper walls to the back parlour fireplace; put brick trimmer arches to all the fireplaces throughout.

Properly turn, parget, and core all the chimney flues, the chimney shafts above the roof being carried up, as shown on the drawings, with the same kind of bricks that are used in the front of the buildings.

Put to each chimney opening proper arches in two $4\frac{1}{2}$ brick rims, and a chimney bar of wrought iron $2\frac{1}{2}'' \times \frac{3}{4}''$, properly turned and cooked at the ends.

The brickwork to be carried up according to the several thicknesses shown in the drawings, the foundations being of stone from 1 foot 4 inches thick, the footings to be walls formed of three offsets of $3\frac{1}{2}''$, 6 inches in height, excepting the bottom course, which must be 9 inches in height.

Cast-iron air-bricks to be fixed in the back elevation between the joists of the floors, so as to allow a circulation of air amongst the floor joists. Of these there must be at least 10 to each house.

Provide and fix in each back kitchen a 20-gallon iron copper with furnace and door complete, and brick setting, with flue entering kitchen chimney flue. A damper to be fixed in a convenient position to shut off the communication of the draught when not in use.

The mortar to be used in the works to be formed of one part of fresh grey stone lime to two parts of clean river sand well mixed together with fresh water, and no more to be mixed at a time than can be used in one day.

The Roman cement to be of the best quality, and mixed with an equal quantity of sand.

Build steps to cellar of bricks laid on edge in cement upon bricks laid flat, to make up the height of each step to 8 or $8\frac{1}{2}$ inches.

Pave the cellars with bricks laid flat in sand as well as the areas outside.

Pave the pathway at the side of the houses round to the back doors with red paving bricks laid well in sand.

MASON.

Put rubbed, weathered, and sunk and throated 4 inches thick, York stone sills to the front windows, those to project 10 inches from the face of the wall where the iron balconies are shown, the stones being mortised to receive the balconies, which must be fitted by being run with lead and made secure to the brickwork as well as the stonework; the sills to the area windows and those in the back elevation to be tooled only.

Put rubbed Portland stone steps to the front doorways, of the length, breadth, and thickness shown in the drawings.

Put tooled York steps to the back kitchen entrance, one step to the level with the floor and forming the sill to the door, the other to be 8 inches lower outside, 9 inches thick, 3′ 9″ long, and 12 inches wide.

Put tooled hearthstones and back-hearths to the scullery fireplaces.

Put rubbed and dressed hearthstones and rubbed back hearthstones to all the chimney-places up and down stairs, the hearthstones to be 14″ longer than the openings.

Put to the four piers of the front windows, top and bottom, polished Bath stones, wrought as shown in drawing of the full thickness of the piers, and to be polished on the return sides.

Put up to the kitchen fireplace a stone chimney-piece with mantel-shelf supported on strong brackets, value 1*l.* 12s.

Put to each sitting-room enamelled slate chimney-piece to each fireplace, of pattern to be approved by surveyor, of the value of 2*l.* 5s. each.

Put up rubbed stone mantels to the bedroom chimney-pieces instead of the above.

PAVIOR.

Pave the porches with rubbed stone, and the pathways of tooled $2\frac{1}{2}$ York paving, with a $2\frac{1}{2}$-inch curb well laid, 3 feet 9 inches in width of pathway, inclusive of curb.

Pave the scullery and pantry with 9-inch square Staffordshire hard red paving tiles, well bedded on sand, the interstices being filled with liquid mortar.

SLATER.

The roofs, front, and ends to be covered with Bangor Countess slates, and the roofs at back with Bangor Ladies slates, all to be picked of uniform colour and thickness, with edges well dressed. No strips or small pieces to be used under the ridge or at the hips of the roof, but whole slates must be properly cut to fit; each slate to be nailed with two composition nails to the slate battens, the slates to overlap at least 5 inches.

The hips and ridges to be covered with neat plain Staffordshire ridge-tiles, securely bedded in and joined to the roof with cement, and to have at the angles of the hips strong wrought-iron L irons for securing same.

Fix in the pantry of each house a rubbed slate shelf 3 feet from the floor, equal in length to the width of the pantry, 1 foot 6 inches wide and 1 inch thick.

OUTSIDE ROMAN CEMENT WORK.

The cement to be of the quality and mixed as specified. Execute in cement the chimney-caps, moulded according to the drawings, and form the architraves and rustics to the porch door openings in front in cement. Execute in cement the leaf Gothic ornaments according to the drawings in the best manner. Cover the area walls at top with cement. Bed in cement the ridge and

hip tiles as specified, and cope in cement the top of the party wall above the roof according to the drawings.

CARPENTER.

All the timber, unless otherwise specified, to be of the best sound well-seasoned Baltic timber, listed free from large dead knots, wany edges, shakes, sap, and other defects.

Sound yellow battens may be used for the smaller carpenters' work, and where oak is used it must be of English growth.

All the floors not specified to be paved must be boarded. The ground-floor joists to be $4\frac{1}{2} \times 2\frac{1}{2}$ inches, laid upon oak sleepers $4 \times 2\frac{1}{2}$, resting upon dwarf walls. The trimmers and trimming pieces to be half an inch thicker than the other joists. The joist for the first-floor rooms to be 9″ by 2″; all the joists throughout to be laid to a gauge of 13 inches from centre to centre.

Four tiers of wall-plates to be laid in the walls: one tier under the ground-floor joists, one under the first-floor joists, and one under the ceiling joists, and one under the rafters of the roof. The ceiling joists to be 4×2, laid to the same gauge as the floor joists; all the 3-inch partitions to be formed of quarters 12 inches apart 3×2, with braces $3 \times 2\frac{1}{2}$, and heads and sills 3×3. All lintels must be 4 inches deep, and 15 inches longer than the width of the respective openings. A tier of herring-bone strutting to be put between the joists of the first floor, to the front and back sitting-rooms, and front and back bedrooms.

The roofs to be formed with rafters 4×2, collars $8 \times 1\frac{1}{2}$, for carrying purlins; purlins $4\frac{1}{2} \times 2\frac{1}{2}$, ridge and hip pieces, $6 \times 1\frac{1}{2}$. The purlins to be securely notched into and nailed to the collars, and the rafters to be notched

upon the purlins and wall-plates, and securely nailed thereto, and to the ridge and hip-pieces. The ceiling joists to be securely nailed to the wall-plates and to the heads of the timber partitions; planed soffit and planed and beaded inch facia boards to be put to the projecting eaves all round, securely nailed to the joists, or to brackets where requisite. The roof to be fitted with proper fillets and tilling fillets, and laid with slate battens $1\frac{1}{2} \times \frac{3}{4}$, properly gauged for the slates, securely nailed to the rafters, none of the rafters of the roof to be more than 12 inches apart.

Proper bearers, $4\frac{1}{2} \times 3$ to be fixed for carrying the cast-iron cisterns over water-closets.

JOINER.

The wood used for the joiners'-work may be the best clean well-seasoned American pine, excepting the floor-boards and door-linings.

Lay the floors with the best yellow deal boards planed, 8 inches wide and $\frac{7}{8}$ thick, laid folding, and securely nailed to the joists.

Put to all the doorways in breadth equal to the full thickness of the several walls, $1\frac{3}{4}$ planed, rebated, and beaded door-linings, grooved to receive the plaster, and securely fixed to the wooden bricks. Put round the entrance-hall and ground-floor sitting-rooms planed inch ogee moulded skirting-boards, securely nailed to wooden plugs in the walls at back. Put mitred verge boards round all the hearthstones throughout the chamber floors and sitting-rooms, all the doorways to the ground floor to be fitted up with beaded and moulded 4-inch architraves.

All the doors to the chamber floor to have $2\frac{1}{2}$-inch mouldings fitted to door-linings.

Fit up to the front-door opening a solid $4 \times 4\frac{1}{2}$ rebated

and chamfered frame, to the outer scullery door a solid and beaded 3 × 3 frame. The front door to be framed with $1\frac{3}{4}$ styles and frame, with bottom $\frac{3}{4}$ panels surrounded with raised mouldings, the upper panel spaces to be circular-topped, moulded, and prepared to receive glass panels; fit up a $1\frac{1}{4}$-inch framed and panelled shutter, to fit inside glass panels, with iron pins and sockets at top, and sockets and thumb-screws at bottom for fixing same.

The doors to be hung with $3\frac{1}{2}$-inch iron butt hinges, and fitted with a strong 10-inch best iron-rimmed lock and brass furniture, a latch-lock, and two 10-inch barrel bolts.

The kitchen door to be $1\frac{1}{2}$ four-panel door. The two top panels to be glazed and fitted with a shutter hung with two strong T hinges, and fitted with Norfolk latch and strong 10-inch barrel-bolts.

The doors to the sitting-rooms to be $1\frac{1}{2}$-inch four panels, both sides moulded doors, hung each with two 3-inch iron butt hinges, and fitted with strong mortise locks with brass furniture.

Fit up the pantry with 2 rows of shelves on strong wooden brackets, planed, rounded on the front edge, $1\frac{1}{2}$ thick and 18 inches wide.

The pantry door to be 1-inch beaded batten door, with 3 back ledges chamfered at edges and ends $6 \times 1\frac{1}{4}$. The door to be hung with two strong T hinges, fitted with a Norfolk thumb-latch and top and bottom barrel-bolts.

Fit up in the scullery a dresser, as shown in section, framed with two drawers, the top of the dresser to be of $1\frac{1}{2}$-inch stuff. The whole to be planed and properly constructed, the drawers to have proper runners and dovetailed angles, and black wood or japanned handles for opening. Under the drawers will be a place for iron

pans, &c., which must have, as shown in section, a front ledge on the floor, 3 inches high. Over the dresser fit up a plate and dish rack, in three tiers, with sides and moulded top, the shelves to have proper ledges, all to be planed, wrought, and properly fitted.

In each front room fit up dwarf cupboard, as shown on the plan, with moulded base, two doors, shelf inside, all wrought, fitted and planed, the doors to have each two iron butt hinges, an inside bolt, and lock. The top of the cupboard to be ledged round with mahogany ledges, the top to be mahogany with moulded fronts.

The doors to be constructed of inch stuff (as well as all the other work connected with the cupboards), and moulded on fronts.

The door between the kitchen and the passage to be four panel, one side moulded, $1\frac{1}{2}$-inch door, hung with two 3-inch iron butt hinges, and fitted with strong iron-rimmed lock, with brass furniture and two strong barrel bolts.

Fit up on the stairs landing a wardrobe and soiled-clothes closet, as shown on drawings, with two doors and boarded partition, the top of the closets to be moulded as shown; the whole to be constructed of inch stuff; the doors to be four-panel square framed doors, with locks and hinges complete. Three tiers of planed inch shelves, 18 inches wide, to be fitted in one closet upon strong wood brackets; in the other closet, wall boards and a row of iron bracket hooks, japanned, for hanging clothes upon.

The space for the cellar steps to be divided from the passage by a beaded inch boarded partition, under staircase to have a 3×3 rebated and moulded door frame, and fitted with a door of the same description as that from the passage to the kitchen, with similar hinges, locks, and bolts.

The staircase to be carried up as shown in the drawings, with inch deal risers and treads, the nosings to be moulded and returned to put in a wrought and beaded wall string from top to bottom of stairs, fitting to skirtings above and below the stairs, to be well blocked and glued together, and fixed on strong fir carriages.

The staircase to have a 3 × 3 wrought and moulded Honduras mahogany handrail, French polished, with turned starting newel and landing posts 3 × 3. Fit into handrail and steps $\frac{7}{8}$ square deal balusters, 3 inches apart, and, in order to stiffen and strengthen the handrail and balusters, three of the balusters to be of wrought iron, with feet and head to receive screws, to be firmly secured to steps and handrail. Put a beaded and planed inch fasia board round the well of the stairs, to hide end of joists, &c.

The four chamber doors to be four panel $1\frac{1}{4}$ inch doors, moulded on both sides, each hung to linings with two 3-inch iron butt hinges, and fitted with strong iron-rimmed, japanned lock, with brass furniture.

Fit up the water-closet with white earthenware basin and trap of Jennings' patent valve closet and trap, with a service pipe from cistern and waste pipe connected with outside drain to cesspool. The riser and seat of the water-closet to be of inch planed deal, fixed on strong fir carriages, the front or nosing of the seat to be rounded and moulded; the seat to have verge board round on wall sides, ledged lid hung with two iron butt hinges, and sides complete.

The door to the water-closet and the door opposite to be four panel square framed $1\frac{1}{4}$-inch doors, hung to linings, with two 3-inch iron butt hinges. The water-closet door to have inside barrel bolt for fastening, and catch-lock with brass handles for securing door when

not bolted. The door to the closet opposite to have iron-rimmed lock and brass furniture.

The windows throughout to have 1½-inch ovolo deal sashes, hung with patent lines and brass pulleys to deal case frames, oak sunk and weathered sills. The frames to be moulded round inside and out. All the windows to have strong patent brass fasteners.

The front entrance door frame to be made for fanlight over.

The closet opposite the water-closet to be fitted up with three tier of shelves on strong wood brackets at the back wall. The shelves to be 1¼ thick and 18 inches wide.

PAINTER AND GLAZIER.

Stop knot and paint three times all the internal and external woodwork, usually painted, in the best oil paint, the last coat to be of the tint required by the surveyor; all the window frames outside to be grained oak, as well as both external doors and frames.

Glaze the front windows with the best flatted glass, and all the other windows with Newcastle crown glass, properly bedded, bradded, and back puttied.

PLUMBER.

Flash round the chimneys with lead, 5lbs. to the foot, and on the side of the party wall above the roof with lead the same weight, properly and securely fixed with lead-headed nails.

Fit up over the water-closet to each house a cast-iron tank, or cistern, by Messrs. Burney and Bellamy, to hold 80 gallons, 4 feet by 2 feet × ⅛. Fit up an iron supply pipe to water-closet from same, 1½ inch in diameter inside. Fit up waste pipe from water-closet to outside drain to cesspool.

Fit up on strong iron brackets neat ogee 5-inch wrought-iron gutters to eaves, with down pipes, having cistern heads, at ends and back of house; the gutters to be jointed with white lead. Connect the bottoms of the down pipes to the drains leading to the cesspools.

Fit up a galvanised or enamelled cast-iron sink, with lead inch waste pipe connected with outside drain to cesspool, the top of the waste pipe to be trapped with a brass bell trap. Lay a lead $1\frac{1}{2}$-inch service pipe from main pipe in road to cistern, to supply the houses from the town waterworks, fitted with copper ballcock complete; connect with same inch lead pipes to sinks, with brass taps and iron fasteners complete.

PLASTERER.

The quarter partitions throughout to be lathed, plastered and set.

The wall throughout to be rendered, floated, and set, except for the kitchen and scullery, which may be rendered and set.

The ceilings throughout to be lathed, plastered, set, and whitened, except the cellar and kitchen, which are to be lathed, floated, and set.

Put beaded angle staves to chimney breasts throughout.

Put to the two parlours, entrance hall, and porch, cornices 6 inches girth, of approved pattern.

The walls in the cellar to be twice coloured in distemper.

IRON-FOUNDER.

Fit up in the kitchen a proper kitchen range, with oven and self-filling boiler, with safety-pipe and ballcock complete.

Fit up in the two parlours, of neat pattern, of the

value of 1*l.* 10s. each complete, good register stoves, the pattern to be approved by surveyor. In the bedrooms fit up false registers, one in each fire-place, of the value of 14s. each, the price to include fixing.

Put iron balconies to front windows, as shown on drawings, pattern to be submitted to surveyor for approval. Fit up to each front door a neat iron knocker and a neat iron-pan scraper.

The cellars and foundations up to the level of the ground may be built in Kentish rag, if preferred to brick, but the chimney stacks must be carried up from top to bottom in brickwork. No stone wall to be less than 16 inches in thickness, the outside walls 1′ 9″ thick.

The front boundary wall to be executed with cement coping, and built with Kentish rag stone and brick piers, as shown in drawing.

Fit up two entrance gates in wall with heel-post $3 \times 2\frac{1}{2}$, clapping-post 3×3, rails $2\frac{1}{2} \times 1\frac{1}{4}$, cross piers 2×2, all chamfered and planed, fitted with latches and fasteners and hooks and eyes complete.

This specification is intended to refer equally to both houses, and to include both, although not specially mentioned in the several descriptions of the works.

A.—This is the specification marked A. referred to in my contract with the dated this ninth day of September, one thousand eight hundred and sixty-two.

The amount of the contract for the pair of houses complete, with front boundary wall and gates, was 513*l.* 14s.

III.—*Specification of Work to be done in erecting and completely finishing a* TEMPORARY STATION *at . , on the .*

Prepare all the timber to the full sizes indicated by the drawings, of foreign timber of approved quality and good sound condition.

The angle, quarter posts, heads, sills, window, and door jambs to be prepared, wrought, chamfered, mortised, and pinned, as the case may be; all outside work to be planed.

The posts and quarters to be $4'' \times 4''$, wall-plates and sills $4\frac{1}{2}'' \times 4''$, ridge-piece $1\frac{1}{2}'' \times 5''$, rafters $2'' \times 3''$. The rafters to be covered with $\frac{1}{2}$-inch close boarding, securely nailed to the joists; side quarters $3'' \times 1\frac{3}{4}''$, securely nailed to the quarters and posts; the whole of the framing to be properly and soundly put together.

The sides and walls to be formed of weather boarding, securely nailed to the side quarters, and lapping at the edges $1\frac{1}{2}$ inch; the boards to be 1 inch thick on the lower and $\frac{1}{16}$ on the upper edges. Construct the doors with planed and beaded battens nailed to strong chamfered backs, three to each door, each $2'' \times 6''$. The doors to be hung with T hinges, and fitted with iron-rimmed spring locks and japanned furniture. Construct the windows with solid frames wrought and rebated to receive sashes, with stops and laths for guiding the rising sashes; the movable sashes to be hung with patent lines on rollers, and a grooved space to be left at the back of the frames for the weights to move freely, and boxed up with $\frac{1}{2}$-inch boards. The windows to have proper fasteners.

The bay-windows to be supported upon wrought brackets planed, two to each window. The bottoms

and tops of the bay-windows to be boarded and roofed with joists and boarding for felt similar to the general roof.

The ticket-window to be fitted with a small mahogany counter, till, and bowls for cash.

The washing-place to have a panel door, half glass, for giving light thereto.

The urinal to be fitted with slate trough.

The water-closet, with seat and riser, of $1\frac{1}{4}$ stuff, and strengthened with brackets and bearers.

The privy, urinal, washing-place, and living-room to be paved with brick laid flat in sand. The sleeping-room to be floored with $1\frac{1}{4}$-inch deal planed boards laid folding, nailed upon joists 14 inches apart and $4'' \times 3''$.

The brickwork to the fireplaces and chimney to be carried up in brick and mortar in a workmanlike manner, according to the drawings, with arched chimney openings, and a cradle bar to each of wrought iron, turned and corked at the ends, $2\frac{1}{2}'' \times \frac{3}{4}''$.

The roofs to be covered with asphaltic felt strained and securely nailed to rafters, and boards at edges, the edges overlapping. The joints to be covered with chamfered laths $1\frac{1}{2}'' \times \frac{3}{4}''$, nailed through felt to rafters and boards. The gables to be protected by planed and under-side chamfered gable hoods, projecting in front and securely nailed down, $6'' \times 2\frac{1}{4}$.

Fit up a seat for passengers with inch planed and front rounded top, front rail and supports planed and wrought according to drawing.

The whole of the work to be performed in a thoroughly satisfactory and workmanlike manner, and the contractor to find, fix, and provide all and all manner of labour and materials for thorough completion of the work, according to the meaning and true intent of the drawings and specifications.

The windows to be glazed with the best Newcastle crown glass, properly bedded, bradded, and back puttied. All the work to be first primed and then twice painted in the best oil colours, as far as concerns all the outside work and all the work that is usually painted.

The contractor to find and fix hearthstones of Machno slate or Yorkshire slab, and back hearths to the fireplaces, and to build proper brick fenders for supporting the hearthstones.

IV.—*Specification of Works to be done in building and completely finishing a* VILLA *to be erected on Lot* 11 *of the Estate belonging to the , at East Cowes, Isle of Wight, with all necessary appurtenances.*

BRICKLAYER AND EXCAVATOR.

Excavate the ground to the depth required for the foundations of the walls and drainage.

Remove and cart away all superfluous earth and rubbish, disposing of the whole or any of the same on the ground adjoining the intended building, or as directed if required for levelling or any other purpose.

As the brickwork rises, fill in and ram the earth close up to the walls until the trenches are filled up to the level of the ground, or to any levels required by the surveyor.

The trenches for the reception of the concrete to be made at the bottom perfectly level, and solid, and hard (by punning, if required) throughout.

The superfluous earth, &c., to be removed as it accrues, without being allowed to accumulate.

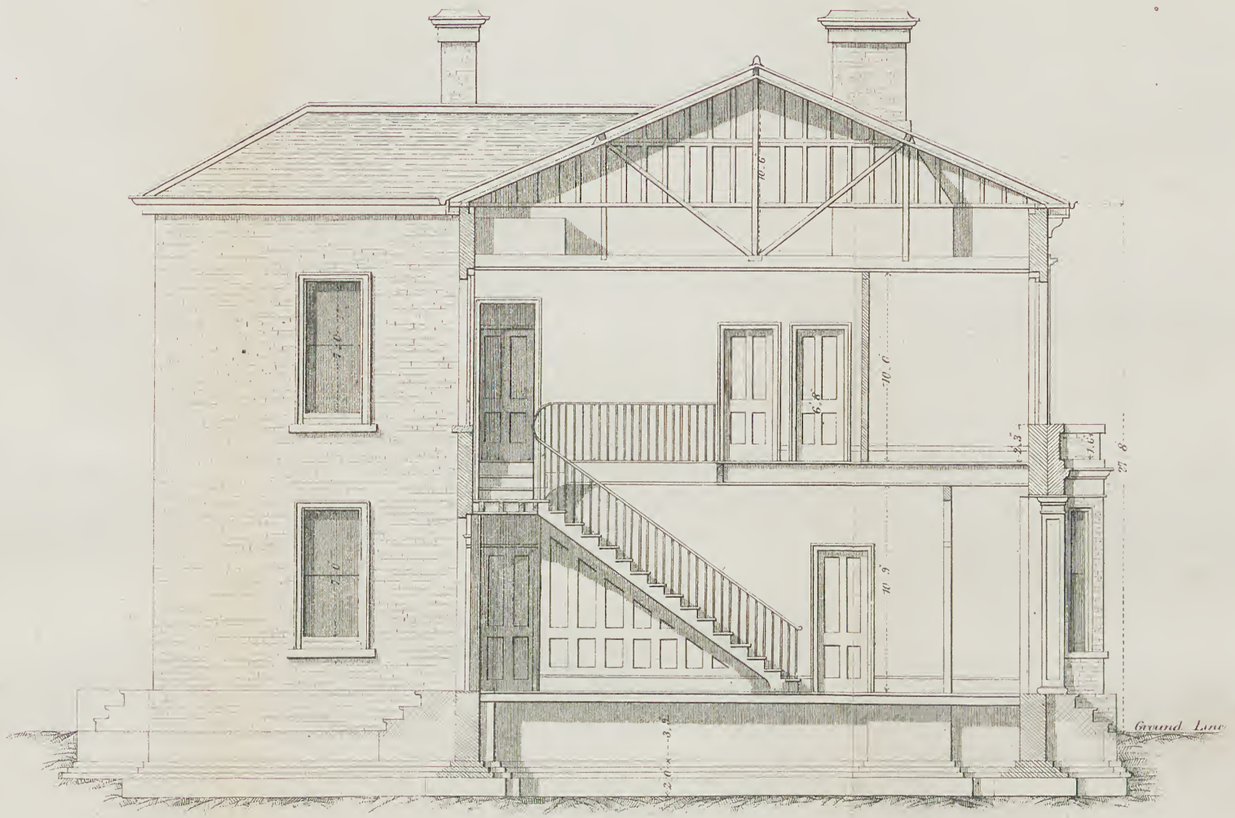
To excavate the ground for the front boundary walls,

No 2

VILLA AT EAST COWES.



ELEVATION.



SECTION.

SCALE OF FEET.

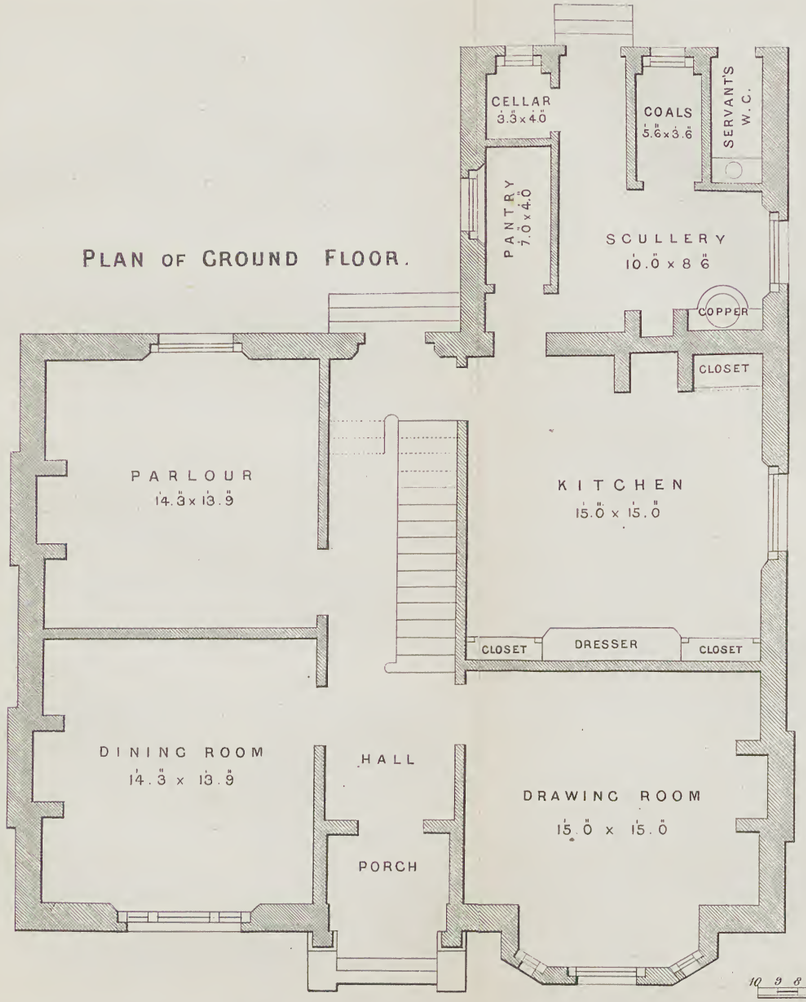
E. & F. N. Spon 16, Bucklersbury, London.

VICTORIAN RAILWAYS
GENERAL LIBRARY

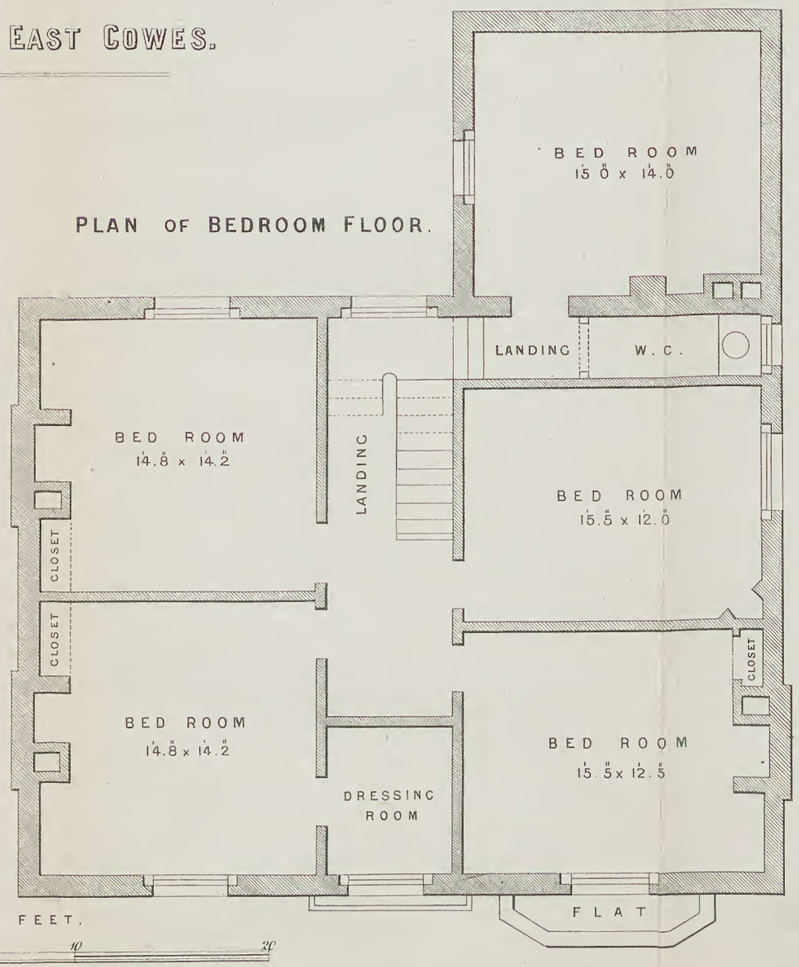
No 1

VILLA AT EAST COWES.

PLAN OF GROUND FLOOR.



PLAN OF BEDROOM FLOOR.



SCALE OF FEET.

10 9 8 7 6 5 4 3 2 1 0 10 20

E. & F. N. Spon, 16 Bucklersbury, London.

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and for such other walls and works as may be specified, performing all the necessary works in the manner already described, filling in all trenches after drains are laid, and soil up to footings of walls.

CONCRETE.

The gravel or stone to be used for the concrete to be screened, and no stone larger than an egg to be used.

The concrete to be formed in the following proportions: Four parts of screened stone, as above, two parts of coarse, clean sand, and one part of fresh, well-burned stone lime.

The lime to be ground to powder dry, the materials in a dry state to be then mixed together, and sufficient water to be added to so much of the material as can be used at once, to give the mass the consistency of mortar.

As the concrete is prepared it must be immediately thrown into the trenches from a stage 10 feet high, from barrows, and puddled to a level surface; or if thrown in from the level, must be well trodden to an uniform level surface at top for the reception of the intended brickwork. Concrete throughout under main walls to be of the width and thickness shown in the section, and a layer of concrete 6 inches thick to be placed to receive the stone paving in offices, the ground being previously made up with hard, dry rubbish.

BRICKLAYER.

The mortar used in the works to be composed of one-third of well-burnt stone lime, by measure, and two-thirds of clean, sharp, river or pit sand, well mixed and incorporated. No more mortar to be prepared at a time than will be required for one day's consumption, and no sea sand to be used in making it.

The quicklime to be covered with sand, &c., and not

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more exposed to the atmosphere than is absolutely necessary.

Roman cement to be used wherever external cement work is necessary or specified, or for interior work, such as the lining for cisterns, &c.

The Roman cement is to be of the very best quality, and pure from the manufactory, and, before being used, to be submitted for the approval of the surveyor for the company.

The cement to be gauged with an equal proportion of clean, sharp, river or pit sand, and in small quantities, at the time of using. If more should be prepared than can be used at once, it should be thrown away as useless, as after it is set it will on no account be allowed to be broken up, and remixed with water or fresh sand or cement.

The cement and sand must be first thoroughly mixed when dry, water being added in due proportion as it is required.

Great care must be used not to disturb any brick or tile work that may be set in cement after the cement has set.

The utmost attention is to be paid to the quality of the lime, the purity of the sand, and the proportions used in making the mortar, and equal care in the preparation of the cement.

The footings to the walls to be in three courses, contracting at each course 5 inches, that is, $2\frac{1}{2}$ inches on each side.

The walls to be carried up according to the thicknesses marked upon or indicated by the drawings, and no four courses of brickwork to rise more than 1 foot, including mortar joints.

The bricks used in the external and thicker walls to be hard, well-burnt, and well-formed kiln-burnt bricks,

those for the external walls particularly; the front to be picked of uniform tint and colour.

Taylor's patent damp proof course must be used throughout the entire thickness of the external walls at the ground line, of widths suitable to the thickness of the wall to be erected. These are manufactured by or for Mr. George Jennings, licensee and manufacturer.

The foundations below the damp proof course to be built solid; but above, all walls of greater thickness than half a brick or $4\frac{1}{2}$ inches, being external walls, must be built hollow; that is to say, that in a wall which if built solid would be 9 inches in thickness, there shall be an air space of the clear width of 2 inches between the walls of $4\frac{1}{2}$ inches each, and that in a wall which if built solid would be 14 inches thick, there shall be a clear air space of 2 inches between the outer $4\frac{1}{2}$ and the inner 9-inch wall, and that in a wall which if built solid would be 18 inches in thickness, there shall be a clear air space of 2 inches between the two 9-inch walls.

In order to ensure the proper carrying out of such hollow walls, Jenning's patent bonding bricks shall be used in manner following; that is to say, that in the horizontal courses of brickwork for all external walls, Jenning's patent bonding bricks shall be used not more than 18 inches apart, and that, vertically, they shall be used in every second course in height; and in order to ensure the performance of the work, the printed illustrated sheet, describing the use of the said patent bonding bricks and Taylor's patent damp proof course, has been incorporated with, and forms part of this specification.

Externally, the walls shall be carried up so as to present the appearance of Flemish bond; the said patent bricks shall be manufactured of a colour to match with

the face bricks; and to ensure perfect uniformity in this respect, the contractor for these works shall supply to the manufacturer of the patent bonding bricks a solid brick as a specimen of the colour of the bricks to be used in the external walls, and particularly for the picked bricks for the front.

The joints in the brickwork to be drawn perfectly straight, and to be neatly flat joint pointed throughout the whole of the external walls.

Throughout the buildings, over all the internal and external openings, where practicable throw 9-inch arches, formed of two separate courses of $4\frac{1}{2}$-inch bricks laid close and radiating to a common centre, and upon proper wood-framed and lathed centre-pieces. The arches to be carried through the whole thickness of the walls and above lintels, where lintels are required; where only half-brick arches are practicable, and there are no lintels, put cradle-bars $2'' \times \frac{3}{8}''$.

Over all the chimney openings build 9-inch arches, in separate rims, upon properly cambered wrought-iron bars $2 \times \frac{3}{4}$ inches, the bars to be 2 feet longer than the widths of the openings, and properly turned and corked into the jambs at the ends.

Carry up the chimney shafts according to the drawings; properly turn, parjet, and core all the chimney flues with cow-dung and lime and hair mortar mixed. The stacks of the flues to be all carried up in solid brickwork, and in no case less than $4\frac{1}{2}$ inches thick, exclusive of the core; no woodwork to be placed in the brickwork of the chimneys, nor nearer than 9 inches to the same.

The projections to the cornice to porch, projections, chimneys, strings, mouldings, and salient courses to be formed in brick, tile, or York stone, and set in good mortar, ready to receive the Roman cement, mouldings,

and dressings. The cantilevers to be worked in tile or brick, ready to receive the cement covering and mouldings.

Under the drawing-room, sitting-room, entrance-hall, and other rooms and passages on the ground floor, erect dwarf walls 4 feet apart and 9 inches in thickness, with proper footings in two courses high each, the bottom course being 18 inches wide for supporting sleepers and joists.

Bed in mortar all wood-bricks, plugs, templets, dragon pieces, wall plates, lintels, and all other woodwork to be set in the brickwork, and so requiring; wall plates $4\frac{1}{2} \times 3$ to be placed under the joists of each floor, each in a complete tier, halved and lapped at the ends; bed upon the dwarf walls for supporting the lower floors oak bearers $4\frac{1}{2} \times 3$.

Over all internal and external window openings insert lintels, as mentioned under the head of Carpenters' work.

Insert all iron and stone work required to be set in the brickwork.

Execute splays, birdsmouth, skewbacks, and chamfers, and cut all channels and holes for bell fittings, pipe fittings, and do generally all cutting, channelling, and jobbing for other trades; fill in all putlog-holes; and execute salient courses, corings, and dubbings, carefully matching all such fillings and finishings as are required to previous work.

Build 9″ fenders in brickwork in mortar, with proper footings to ground-floor fire-places and brick-trimmer arches ($4\frac{1}{2}$) in cement, for supporting chimney slabs to all the other floor chimney places throughout, well grouting the same.

Fill up interstices and point round in lime and hair mortar all door-frames and all window-frames.

Build dwarf walls for supporting sink, and set the copper and grates throughout.

Fit up in the scullery a strong 20-gallon copper in brickwork, in the best manner, with furnace—door, damper, and circulating flue complete.

Provide sufficient safe standing, scaffolding, poles, planks, putlogs, ladders, blocks, pulleys, rope and tackle, and implements of every kind requisite for the proper completion of the whole of the works. The scaffolding to be left standing until the buildings are ready to be rendered up as complete.

The bricks to be wetted before being used, and the mortar must be used as stiff as possible, but the bricks must be protected from excessive rain as much as possible; the bricks for interior walls should be wetted with lime-water.

All the timber partitions on ground floor to be filled with brick flat nogging set in mortar, the bricks being filled in in horizontal courses.

Excavate for a cistern for rain water in any convenient situation to be pointed out by the surveyor near the building, to be constructed of 9-inch brickwork set in cement—a cistern 8 feet long and 6 feet wide, to be arched over with 4½-inch brickwork set in cement, the crown of the arch being 3 feet below the natural surface of the ground, and the bottom of the cistern 5 feet below springing of arch; the cistern inside to be paved with brick laid edgeways, set in cement, and the bottom and the sides up to the arch to be lined with cement ¾-inch thick, a manhole to be left in the arch to be covered with a 4-inch York flag 3 feet by 2 feet. The ground to be filled in and levelled to the natural surface when the cistern is finished, and an iron pump with brass valves to be fitted up to the cistern for pumping water therefrom.

Build the front boundary wall according to the drawings, with piers 18 inches square, the plinth being 23 inches square; the walls between the piers to be 14 inches thick below the plinth, and 9 inches thick above the same. The walls and piers to be carried up in brick picked of uniform colour, well flushed in with mortar, and neatly pointed outside. Provide proper chamfered bricks for plinth, the top of the piers to be moulded and finished in cement as shown in the drawings.

The wall between the piers to be coped with Portland stone 4 inches in thickness, to be throated, and to project 2 inches over the wall on each side; the stones to be plugged and run with lead at joint, and drilled at proper distances to receive the iron railings. Build in a central position between each pair of piers, dwarf, offset, or spur walls, for fixing spurs to standards for supporting the iron railing into these walls, to be also coped with stone; all the stonework to be neatly boasted and worked square.

MASON.

All the stone used to be the best of its kind, as specified, free from rents, sand-holes, streaks, and other defects. The York to be the hardest quality from the under-beds, and the Portland stone from the best quarries.

The mortar and cement to be as specified for the brickwork and plasterer's work; lime, putty, and plaster to be used where the class of work requires them.

The masonry is to be worked and put together in the best manner, with all requisite sinkings, throatings, drips, jogglings, &c.; all that is not described as tooled is to be rubbed fair and carefully worked.

Pave the portico with rubbed Portland stone, perfectly firm and level bedded on sand, the edges to be

rubbed to fit perfectly straight and true, the joints to be set with cement, the stone to be 4 inches thick.

Put rubbed Portland stone steps to porch door as shown on drawings with moulded nosings.

Put to all the front upper windows, sunk and weathered and 4-inch thick rubbed Portland stone sills; and to the front ground floor windows moulded sills, with trusses, where shown, to dining-room window; and continue the one-pair sills to form string home to the first chimney breast on each flank.

To all the other windows throughout, put sunk and weathered York stone sills, tooled as fair as possible.

Pave the pantry, scullery, coal place, cellar, and water-closet with 3-inch York stone, rubbed, laid, and set with cement.

Fit up in the scullery a 6-inch sink, as shown in the drawing, properly sunk and tooled fair; sunk for bell-trap, and pierced for waste pipe, supported at the end with 4½-inch brick wall in cement.

Put to back outer doors three tooled York stone steps.

Put to the kitchen a hearthstone and back hearth of York stone, tooled fair; the hearthstone to be 18 inches longer than the width of the opening, and 2 feet 6 inches wide.

Cope the parapet wall to the front bay-window, and finish the top of porch with Portland stone 4 inches thick, according to the drawings, joggled at the joints in cement; the joints to be well filled with cement, and the coping bedded on cement.

Put to front and back rooms, hearthstones and back hearths of rubbed Yorkshire stone, the hearthstones 18 inches longer than the width of the chimney openings and 2 feet wide.

Fit up in kitchen and scullery York rubbed stone

chimney-pieces, with jambs haunch-cut, and wide shelf; the shelf to be supported on strong and rubbed stone brackets.

Fit up a moulded enamelled slate chimney-piece in drawing-room, with ornamental trusses, the value of 5*l.* net cost at shop.

Fit up enamelled slate chimney-pieces in parlour and dining-room, of the value of 3*l.* 10s., each shelf supported on trusses, net.*

Fit up in two front bedrooms enamelled slate chimney-pieces, moulded, of the value of 3*l.* 10s. each, net; and to the other chimneys in the bedrooms on this floor, chimney-pieces of the value of 2*l.* 10s. each, of enamelled slate.

In all cases the sums stated to be prime cost, and the chimney-pieces to be submitted to the surveyor, for him to approve or reject the same.

Provide labour, cement, putty, holdfasts, and all other requisites for properly fitting and fixing the chimney-pieces, hearthstones, and appurtenances.

Provide York stone, templets, keys, cappings, and other stone and labour, also cramps, lead, and cement; and cut all holes, mortises, rebates, chases, grooves, and execute all other jobbings necessary for the perfect completion of the stonework and other branches of work where the aid of a mason may be requisite.

CARPENTER.

All the timber used, except otherwise specified, to be of the best, sound, and well-seasoned Baltic, Memel, or Riga timber, free from sap, wood shakes, and large dead knots.

The deals to be from Christiana, and the oak of English growth, sound, well seasoned, and close grained.

* The drawing-room chimney-piece and stove will be found by the proprietor.

Oak plates $4'' \times 3''$ to be laid on the sleeper walls and piers of the basement for carrying the flooring joists.

The joists to the ground floor to be $5'' \times 3''$, nailed upon the oak sleepers and wall plates.

None of the joists, rafters, or quarters to be respectively more than 12 inches apart, or 15 inches from centre to centre, except to the brick-nogged partitions, which are to be 2′ 3″ apart.

In all cases the trimmers and trimming joists to be $\frac{1}{2}$ an inch thicker than the common joists.

Three tiers of wall plates, $4\frac{1}{2}'' \times 3''$, to be inserted in the walls as specified under the head of brickwork.

The joists to the first floor to be $9'' \times 2\frac{1}{2}''$, securely notched to wall plates and heads of framed partitions, and to have proper trimmers and trimming joists.

The floors to be bridged with herring-bone strutting, one row down the centre of each room.

The roof to the main building to have pole plates $5'' \times 3''$, wall plates $4\frac{1}{2}'' \times 3''$, rafters $4'' \times 3''$, purlins $5\frac{1}{2}'' \times 4''$, tie beams $8'' \times 3''$, ring piece $4'' \times 6''$, principal rafters $6'' \times 3''$, struts $4'' \times 3''$, ridge pieces $7'' \times 2''$, hip pieces $7'' \times 2''$, valley $9'' \times 3''$, all securely framed, and proper screw bolts and straps where required.

The rafters to be firmly notched and nailed to purlins, pole, and wall-plates, and nailed to ridge and hip-pieces.

Inch-deal gutter boards and proper bearers.

All the roofs to be covered with $\frac{3}{4}$-inch rough boarding, securely nailed to rafters for carrying the slates, and to have $2\frac{1}{2}$ proper hip ridge rolls.

The ceiling-joists to the bedrooms to be $3'' \times 2''$, with proper fillets spiked to walls to receive same, and a binder $8'' \times 3''$ to be fixed across back bedroom.

The quarter partitions throughout to have heads and sills $4'' \times 3\frac{1}{2}''$, door jambs and heads $4'' \times 3\frac{1}{2}''$, all properly framed, with quarters $4'' \times 2''$, struts $4'' \times 2\frac{1}{2}''$.

Put strong rebated and beaded angle staves* to the chimney-breasts in the principal rooms, which may be painted instead of being papered, and the same kind of staves to all projecting angles. Put square angle staves to all the rest of the chimney-breasts.

Put lintels over all the internal and external openings, 4″ thick and 18″ longer than the respective openings, and of the width required, and put bressammer 9″ × 8″, with 3″ York paving on top to carry wall over opening to bay.

Fix all fillets that may be required, and all tilting fillets for the proper performance of the slating.

Nail to the trimming joists skew pieces for the brick trimmer arches to spring from.

Provide and fix proper strong fir bearers for carrying cistern to supply water-closets, &c.

Construct in the best manner the works in the carpenter's branch that are set forth in the specifications and drawings, so as to avoid failure from thrust or settlement, using all necessary wall-plates, templets, bond wood bricks, joists, frames, quarter posts, sills, heads, braces, strutts, lintels, ceiling joists, common rafters, hip, valley, and ridge ditto, purlins, angles, ties, stays, shoes, pins, plugs, blocks, plates, furring bolts, spikes, nails, wall hooks, straps, and other requisite materials, and performing pinnings, mortisings, furrings, jogglings, notchings, housing, and all other requisite operations for making the works complete. But no more timber to be introduced into the walls than is absolutely necessary for the proper execution of the design.

Construct the flat roof over bay-window with joists 4″ × 2½″, wall-plates, 4 × 3, covered with inch boarding for lead-work, with properly formed cesspool and drip.

* These are now commonly executed in cement as well as skirtings to halls, kitchens, and offices.

JOINER.

The framing, floor boards, skirtings, and door linings are to be of Norway deals and battens. Elsewhere the joinery may be of white deals and battens, excepting the window sills, which are to be properly wrought, and of the best English oak throughout.

The floor boards to be prepared immediately the contract is signed, the framing also to be commenced immediately, leaving the works to be wedged up as wanted, to be kept in some dry warm place, and care taken that at no subsequent period they shall be exposed to rain or moisture.

The whole of the framing, before leaving the shop, to be knotted with red lead.

All the floor boards to $1\frac{1}{4}''$ straight joint edge nailed, except in inferior rooms and offices, which are to be inch laid folding.

All hearths to have clean mitred, tongued, and glued margins $2\frac{1}{2}$ inches wide by the thickness of the floor-boards.

Proper fir bracketings, grounds, and blockings to be provided and fixed for all joinery.

The skirtings in the drawing-room to be $1\frac{1}{4}$ deal, sunk 13 inches high, and moulding on same 5 inches girt.

The skirtings in the hall, passage, parlour, and dining-room to be $1\frac{1}{4}$ deal sunk 10 inches high, and mouldings 4 inches girt on same.

The skirtings to the kitchen, pantry, and scullery, and servants' water-closet, to be 8 inches high, beaded at top.

Put to the hall front door solid $4\frac{1}{2} \times 4''$ deal frame, chamfered at exterior edge, beaded at back, rebated to receive door, and framed for fanlight over. Put 5-inch

moulded architrave round inside. The joiners' work, and all the work throughout, to be properly smoothed and planed, knotted and stopped.

The front door to be in two halves, folding, beaded, and rebated to fit in front, the panels in each half with raised mouldings, panels $\frac{3}{4}$ thick, as shown in drawing. The door to be formed with 2-inch stuff, properly framed, and panels moulded inside. Each half to be hung with three 5-inch strong iron butt hinges, fitted with two (four for both halves) strong iron barrel bolts and sockets, a 10-inch strong iron-rimmed drawback lock, with rosewood furniture, 12″ brass barrel chain, and two iron knockers of approved pattern.

The back outer doors to be solid framed, frames 4″ × 3″, beaded and framed for fanlight over, with moulding on transom outside. The door to be $1\frac{3}{4}$, bead flush and moulded, strongly framed, hung with three 5-inch strong iron butt hinges, fitted with two 10-inch barrel bolts and sockets, and fitted with a strong 10-inch iron-rimmed drawback lock and Norfolk thumb-latch to each, the lock to door at back of hall to have rosewood furniture.

All the doors opening from the hall or passage to be 2″ deal 6-panel framed doors, moulded outside, those to the drawing-room, parlour, and dining-room to have raised mouldings inside. All the doors to have $1\frac{1}{2}$ beaded and rebated deal linings of breadth equal to full thickness of wall, and grounds grooved to receive plaster, to have moulded 5-inch architraves inside and out, except kitchen door at end of passage, which is to have 3-inch girt moulding. All the doors to be hung with two strong 4-inch iron butt hinges, and fitted with 6″ strong mortise-locks of the best kind, with rosewood furniture.

Fit up the water-closet on chamber floor with Hon-

duras mahogany front, moulded inch seat, and moulded panelled riser, inch mahogany beaded margins, clamped inch mahogany flap, $\frac{3}{4}$-inch skirting 4 inches high round walls, with proper fittings and hinges, and seat and riser made movable.

Fit up $1\frac{1}{2}$ deal linings to kitchen, scullery, pantry, and cellar doors with architrave mouldings 3 inches girt, the cellars on outside only. The doors all to be square framed $1\frac{1}{2}$ inch moulded one side, 4-panel, and each hung with two $3\frac{1}{2}$-inch iron butt hinges, fitted with 7-inch iron-rimmed lock and brass furniture.

Fit up $1\frac{1}{4}$ framed fronts to two closets in kitchen, with panel outside doors. The frames to be made for two sets of doors each, the lower doors opening into closets for iron pans, &c., the upper doors into closets, which are to have three rows of inch shelves of full width of closets, and division between upper and lower closet fitted upon strong wood brackets, the doors to be made folding, hung with strong iron butt hinges, and fitted with good strong locks, brass knobs, and inside bolts.

Fit up the kitchen on side opposite fireplace with a dresser, having $1\frac{1}{2}$ deal clamped top, inch deal pot-boards and bearers, proper framed legs and rails, three drawers with brass drop handles, four tiers of inch deal sunk plate shelves, $1\frac{1}{4}$ cut standards $\frac{3}{4}$ deal, matched and beaded back lining, and $\frac{3}{4}$ deal facia with moulding at top.

Fit up in hall a mahogany double moulded rail 4″ by $\frac{3}{4}$, and 6 feet long, with returned ends, and No. 6 brass hat and coat hooks.

All the external windows to have deal cased frames, and $1\frac{3}{4}$ double hung moulded sashes, oak sunk and weathered sills, sashes hung with white patent lines and fitted with brass runners and lifts, and spring fasteners

and iron weights complete. Inch deal tongued and splayed linings and soffits, and 5-inch beaded and moulded architraves. The architraves to be continued to the floor in all the principal rooms, to have rounded and moulded window-boards, the space or dado under window-board to be framed, panelled, and moulded.

Windows to all the principal rooms to be as above, and the windows glazed with plate-glass, to have lead weights instead of iron.

The kitchen window to be double hung, and in all respects as strong and well fitted as the windows described, excepting that it is only to have 3-inch girt mouldings and plain rounded window-board, no dado.

The scullery, cellar, and rest of ground-floor windows to be ovolo and single hung only, plain rounded window-boards and staff beaded linings without inside mouldings.

Fit up servants' water-closet with deal seat on strong fir carriages, and deal riser.

The water-closet door to be inch deal proper ledged, hung to 4×3 solid frame with two strong 18″ cross garnet hinges, and to have a Norfolk thumb-latch and a barrel-bolt inside.

Fit up to the four principal bedrooms inch deal moulded skirtings 10 inches wide, and to the passage and other bedrooms 8-inch moulded skirtings, same to dressing-rooms and water-closet.

All the doors to have $1\frac{1}{2}$-inch beaded and rebated linings, inch framed grounds, and 3-inch girt moulded architraves inside and out. The doors to be both sides moulded $1\frac{1}{2}$-inch, four-panel square-framed doors, each hung with two $3\frac{1}{2}$-inch iron butt hinges, and fitted with 6″ mortise locks and rosewood furniture.

The floor-boards and margins to chimney-places to be same as described for ground floor.

The front windows to be carried out as shown on the drawings, with deal cased frames, double hung sashes and linings, moulded window-boards, moulded architraves, and all other fittings as described to front lower windows, dados only excepted.

All the rest of the windows on this floor to have sashes and cases in all respects similar, moulded architraves and window-boards, but no dados.

Provide proper ledged lid with handle to cover copper.

Fit up the pantry with three rows of inch shelves 12″ wide, on strong wooden brackets, and a slate bench across the end two feet from the floor, in length equal to the full width of the pantry. The bench to be securely fixed in the walls, to be 1 foot 6 inches wide and $1\frac{1}{4}$-inch thick.

Fit up a ledged trap-door, to get to cistern in roof over water-closet, with hinges and fastener, and beaded facia boards to hide joists; put trimmers for carrying any joists cut for trap-door.

Fit up in three of the bedrooms, as shown on the drawings, dwarf closets with mahogany inch tops and $\frac{3}{4}$-inch skirtings 3 inches high, the closets to be framed with proper heads and stiles, fitted inside with two rows of inch deal shelves, and to have to front for each two $1\frac{1}{4}$-inch panelled and moulded and square doors, hung with two strong butt-hinges each, and with locks, bolts, brass knobs and roses.

Over the sink in the scullery fit up a rack for plates and dishes, three tiers high, the rack to have sides of inch stuff.

Fit up the front boundary wall with entrance gates, as shown on drawing, with 2-inch rails and stiles, rebated and beaded to receive beaded panel boards. The gates to be made to open as shown on drawings, to be

moulded at top, and hung with strong patent hinges and bands properly let into 6-inch York hinge stones 14 × 14, and to have 8-inch, copper-warded, two-bolt lock, with bronze furniture, strong bolts at back, with post let into ground with iron socket for bolt.

Case the soil pipe from upper water-closet and services to same with $1\frac{1}{4}$ rebated beaded grounds and $\frac{3}{4}$ deal clamped panels, fixed therein with screws.

STAIRCASE.

The staircase to be fixed on strong deal carriages, notched to receive the steps. The steps to be formed with inch risers and $1\frac{1}{2}$-inch tread, moulded and rounded in front, and returns to have neat brackets, as shown on the drawings; to be properly backed, glued, and securely put together. The hand-rail to be of Spanish mahogany $2\frac{1}{4} \times 2\frac{1}{4}$, wrought, moulded, and polished. The balusters to be inch square deal, with occasional wrought-iron baluster for strengthening the same.

The bottom steps to have compass end glued and bracketed, with curved hand-rail, as shown in drawings.

Put $1\frac{1}{2}$-inch deal, moulded wall strings, and $1\frac{1}{2}$-inch deal sunk, return, beaded, cut, and mitred outer string, and $1\frac{1}{4}$-inch sunk and return beaded apron linings, with moulded nosings.

A moulded and square-panelled $1\frac{1}{2}$-inch spandril to be put under stairs, as shown in drawing, with door to form a lumber closet; the door jambs to be solid 3 × 3 rebated, with 3 × 3 also rebated, all beaded at edges, and fitted with a moulded and square four-panel door, fitted with head lock and brass furniture, and hung with two $3\frac{1}{2}$-inch iron butt hinges.

Execute all other work necessary for the perfect completion of the joiner's work in every respect.

GLAZIER.

Glaze the bay-window fanlight over front door and front window to parlour with strong polished plate-glass, and the other windows and fanlights with the best 26-ounce sheet-glass, properly bedded in, bradded, and back puttied.

PAINTER.

Stop knot and paint four times in the best oil colours all the woodwork and external and internal ironwork usually painted.

Grain in imitation of oak, and twice varnish, all the external doors and windows.

The last coat of paint for internal work to be executed in such colours as the surveyor shall direct.

The bars of the stairs to be painted four coats, and finished green 12 inches on either side; the treads and risers to be painted four coats, finished dead white.

The woodwork to the eaves, and iron gutters, and down pipes to be finished stone colour.

The front door and entrance gates to be grained in imitation of oak, and twice varnished.

The iron railings in front to be finished dark olive green.

PLASTERER.

Execute in cement the plinths, mouldings, strings, and cornices, as shown in the drawings, including architraves to windows, cornices to front windows, and brackets to main cornice and window to dining-room.

All the mouldings to be sharply and neatly executed, and according to the drawings, and to such enlarged drawings and sections as may afterwards be supplied.

The channels in the quoins to be neatly executed, and the quoins returned at the angles.

The chimney caps and bases to be executed as shown in the drawings.

The cement to be prepared and used as described in the specification for bricklayer's work.

Lath, plaster, float and set, clearcole, and whiten all the ceilings to the principal rooms and passages.

Lath, plaster, and set, and clearcole, and whiten all the other ceilings throughout.

Render, float, and set all the walls throughout the principal rooms and passages, and render and set all the walls to the other rooms throughout. Soffits to staircase to be executed in the same manner as the principal rooms and passages.

Execute in the best manner clear, sharp-moulded cornices to the principal rooms on the ground and first floor and staircase, according to the drawings, or such other drawings or sections to a larger scale that may be supplied.

Lath, plaster, float, and set the timbered partitions throughout, and soffits of staircase.

The plasterer's work to include all cutting of moulds for running cornices, and rubbing and bracketing where necessary.

The plaster and hair must be very well mixed together, and sufficient time allowed for their amalgamation; the lime to be well ground.

Cement filleting to be used wherever necessary, and carefully executed.

No labour must be spared in working the face, so as to prevent blistering and cracking after work is done.

The plaster cornices to be carefully worked in every respect, and neatly mitred at all salient and re-entrant angles; the returns setting off truly at right angles, unless otherwise intended.

Render smoothly the brick sides, &c., of fireplaces.

Provide all moulds, and do all doubling out, also all repairs at completion.

Lay in between the joists of one-pair floors, boards $\frac{3}{4}$ inch thick, on which spread a coat of lime and hair 1 inch thick.

The walls to the kitchen, scullery, pantry, and down-stairs water-closet to be twice coloured in distemper; the walls of cellars to be stopped and twice lime whited.

IRON-FOUNDER.

Provide cast-iron strong tray boot-scrapers to front and back doorways.

Fit up a close 42-inch range in kitchen, with self-acting boiler, &c., complete, of the value of 5*l.*, cost price.

Fit up in drawing-room bright register stove-grate, of the cost price of 6*l.*, prime cost.

Fit up in parlour and dining-room register stove-grates, cost price of 1*l.* 15s. each.

Fit up in two best bedrooms register stoves 35s. each; and in other bedrooms register stoves value 25s. each.

Fit up in scullery strong grate, with hobs and wrought-iron bars.

Provide guttering and down pipes, with brackets and holdfasts proper for same.

Provide wrought-iron chimney bars to all chimney openings, as specified.

The spouting to be submitted for inspection of surveyor before being used.

Fit up in roof over water-closet large and strong wrought-iron cistern for supplying water-closet, boiler to kitchen, and sink, to hold 50 gallons. The boiler to be fitted with self-acting tap, with ball-cock and trough for self filling.

Iron railing to be provided and fixed on the stone

coping on dwarf wall in front, $\frac{7}{8}$-inch cast-iron round bars 6 inches from centre to centre, and standards $1\frac{1}{4}$ diameter, with back stays all run with lead; the uprights to have ornamental heads, as approved by the surveyor; wrought-iron horizontal top rail $2\frac{1}{4}'' \times 1\frac{1}{2}''$, 2 feet 9 inches from top of stone coping.

Provide and fix thirty-eight iron bricks, for giving ventilation to floors.

Provide a 20-gallon copper, as described in bricklayer, and put lead curb to same 5 lbs. to the foot super.

PAVIOR.

Six-inch metallic earthenware pipe drains, with patent saddles, to be laid from the water-closets, sink, and overflow from tank and pump at a proper inclination, as shown on drawing, and properly made good to existing drain, fitted with proper syphon metallic earthenware traps to the sink, overflow, and pump.

Put 6-inch tooled sink $2' \times 1'$ 6″ under pump, with 6-inch cast-iron grating in same, and $\frac{1}{2}$ brick cesspool under.

From the bottoms of the down conductors lay to a proper inclination to the soft-water cistern 4-inch and 6-inch socket metallic earthenware pipes, well clayed at the joints, for conveying rain-water to tank, with all proper junctions and bends complete; the pipes to pass through a sediment pit built of $4\frac{1}{2}$-inch brickwork set and rendered in cement inside and puddled outside with clay before entering tank. The sediment pit inside to be 12 inches by 12 inches, and 3 feet 6 inches deep, covered with a flagstone.

PLUMBER.

Cover the ridges and hips with lead 5 lbs. to the foot 18 inches wide. Form the valley with lead of the same weight turned up 12 inches up the slopes.

Flash round the chimneys with step flashing, well secured into brickwork, 15 inches wide and 5 lbs. to the foot, and line gutters behind same with 5 lb. lead.

Cover the flat over the front bay-window with lead 5 lbs. to the foot, and put flashings 6 inches wide round.

Put to the eaves strong 5-inch moulded cast-iron gutters, with plain clips jointed with white lead, and securely fixed to feet of rafters.

Put strong 3-inch cast-iron down pipes with cistern heads from principal roof at proper places, and with double bends to get round cornice. Carry the water from flat over bay-window with 3-inch double-bent lead socket pipe soldered to cesspool, and made good to 3-inch cast-iron down pipe to carry water to drains.

Lay the water on from the town water-works with inch lead pipe and inch roundway ball-cock, with screw bottom and boss and copper ball to the cistern, and put $1\frac{1}{4}$-inch strong waste from same, with washer and waste, and trumpet standing waste.

Put proper 5-inch soil pipe of iron from upper water-closet to drains with proper lead; bend at top, and put 5 lb. safe to same, with waste and dribble complete.

Fit up servants' water-closet with white glazed-ware basin and trap properly made good to drain; lay on water to same with $\frac{3}{4}$-inch branch lead service from nearest pipe with Jennings's patent water-closet apparatus and trap, with regulator, flue, basin, and opal-glass handle; lay on the water with inch lead service.

Do all other necessary work of the nature of plumber's work requisite for the buildings in every particular.

Provide and fix a proper brass bell-trap to sink with fittings complete, and supply pipes to sink fitted with $\frac{3}{4}$-inch brass bib-cock complete, with screw bottom and boss; put 2-inch waste from same to drain; lay on water to copper with $\frac{3}{4}$-inch branch service and bib-

cock as to sink, and lay on water to supply cistern of boiler with ½-inch branch service and ball-cock.

Put lead in a proper manner wherever it is obviously necessary to make the roofs water-tight, the water supplies and discharges all secure and water-tight, using all solder wall hooks, holdfasts, brackets, lead-capped nails, and tacks that may be wanted to carry out in a complete and proper manner all the plumber's work.

Provide and fit up to water-tank a 4-inch iron pump with brass valves complete, and a 3-inch suction pipe therefrom with rose end to water-cistern, with proper bends, &c.

SLATER.

Cover the roof with Bangor countess slating, each secured to the battens with two strong copper nails.

The slates to be laid with 3-inch laps and proper bond. Must be cut for gutters, eaves, and hips; no slips or small pieces will be allowed to make bond.

PAPER-HANGER.

The walls to be sized, and prepared for papering. The bedrooms all to be papered, the principal bedrooms with paper 3d. per yard, the back bedrooms with paper 1½d. per yard. All the papers to be submitted to surveyor for approval.

No papering to be done on the staircase walls, or on any walls of the ground floor or water-closet.

BELL-HANGER.

The house to have a bell to ring from the entrance gate and principal entrance door, one from each sitting-room on the principal floor, and one from each bed and dressing-room on the first floor. The wires to be best copper, concealed in zinc tubes where necessary. The

whole of the rooms to have approved rosewood lever pulls—viz. one in each of the bedrooms and dressing-room, and two in the dining and drawing-rooms and parlour, and the entrance door and gate each to have an ornamental bronze sunk pull.

A bell-board with the bells to be fixed in the passage on the ground floor opposite the staircase. Each bell to have a vibrating pendulum.

Each bell to be of a different tone, and the whole of the work to be done in a complete and satisfactory manner.

This is the specification marked A referred to in my contract with the
dated this 18th May, 1863.

The contract for this house, with front boundary wall and iron double-entrance gates, was 1035*l.*; if the patent bonding bricks had been used, the cost would have been 1050*l.*

April, 1863.

Gentlemen,

willing to execute the works required in building a villa at East Cowes on Lot No. 11 of your estate, according to the drawings and specification of architect, for the sum of £

If iron cramps are used in the hollow walls in lieu of Jennings's patent bonding bricks, it will occasion a difference of . . . .

£

Gentlemen,
Your obedient servant,

To the Chairman and Committee of the

Schedule of Prices from .

	£	s.	d.
Excavation and levelling, per yard cube, 8d. to	0	0	10
Concrete „	0	6	0
Reduced brickwork, per rod	11	10	0
Bricknogging, per yard	0	2	9
Stock brick paving flat, per yard	0	1	9
Gauged arches, per foot	0	2	6
Brick trimmers in cement, per yard	0	5	0
6-inch glazed pipes and digging, per foot, 10d. to	0	1	0
4 „ „ „ „ 8d. to	0	0	10
Bedding window-frames, each	0	1	0
Slating, per square (countess)	1	16	0
Slating battens, per square	0	7	0
1¼ slate tank, per foot	0	1	3
Fir timber in framework, per foot cube	0	3	0
Oak „ „ „	0	5	6
Door cases „ „	0	6	0
1½ dovetailed cistern „	0	0	9
⅞ white floors, laid, per square	1	5	0
Inch „ „	1	10	0
1¾ sashes and frames, per foot	0	1	4
2, 4-doors, double moulded, per foot	0	1	2
1¼ square framed shutters, 10d. to	0	1	0
1¼ „ closet fronts and doors	0	0	10
Render, float, and set, per yard	0	0	7
Lath, float, set, and white, per yard	0	1	5
12-inch cornice, per foot	0	0	10
2½ York paving square and laid, per 100 feet	4	10	0
Portland moulded steps, per foot	0	5	0
„ boxed mantles, from	1	0	0
Marble „ „	3	0	0
2½ York landings, per foot	0	1	1
Stone brackets, from	0	7	6
York window-sills, per foot, from 1s. 3d. to	0	2	9

Ironmongery.

Eaves, gutters, plain, per foot	0	0	8
„ moulded, per foot, from 10d. to	0	1	0
Air-brick, each, from 6d. to	0	0	9

Painter.

4 oils flatted, per yard	0	1	0
„ grained, „ from 2s. to	0	2	6
„ green „ „ 1s. to	0	1	6

Plumber.

	£	s.	d.
Lead complete, per cwt., from 30s. to	1	12	0
1-inch supply pipe, per foot	0	1	2
1½ „ waste pipe, „	0	1	8
¾ „ service pipe, „	0	1	0

Glazing.

Plate glass, from 3s. to	0	4	6
Newcastle crown, according to quality, from 6d. per foot to	0	1	3

Schedule of Prices.

	£	s.	d.
Excavation and levelling, per yard cube	0	0	8
Concrete	0	6	0
Reduced brickwork, per rod	11	10	0
Bricknogging, per yard	0	2	9
Stock brick paving flat, per yard	0	1	9
Gauged arches, per foot	0	2	6
Brick trimmers in cement, per yard	0	5	0
6-inch glazed pipes and digging, per foot, 10d. to	0	1	0
4 „ „ „ „ „ 8d. to	0	0	10
Bedding window-frames, each	0	1	0
Countess slating, per square	1	16	0
Slating battens, per square	0	7	0
1¼ slate tank, per foot super	0	1	0
Fir timber in framework, per foot cube	0	3	0
Oak „ „ „ „	0	5	0
Door cases, per foot cube	0	6	0
1½ dovetailed cisterns, per foot super	0	0	9
Fencing, per perch			
⅞ white floor, laid, per square	1	4	0
1-inch „ „ „	1	8	0
Sashes and frames, per foot super	0	1	4
2-inch four-panel doors, double moulded, per foot super	0	1	2
1¼ „ square framed shutters, per foot super	0	1	0
1¼ „ closet fronts and doors, per foot super	0	0	10
Render, float, and set, per yard super	0	0	7
Lath, float and set, and white, per yard super	0	1	5
12-inch cornice, including mitre, per foot	0	0	10
Box mantels, each, from 20s. to	1	10	0
Marble mantels, each, from 60s. to			
2½ York landings, per foot	0	1	1
Stone brackets, each	0	10	0
2½ York paving square, &c., laid, per 100 feet	4	10	0
Portland moulded steps, per foot	0	5	0
York window-sills, per foot, 1s. 3d. to	0	2	9

Ironmongery.	£	s.	d.
Balcony railings, per foot,			
Handrail, per foot			
Ranges, each, from	3	10	0
Eaves, gutter, per foot	0	0	8
Air-bricks, each	0	1	0

Painter.			
4 oils flatted, per yard	0	0	8
„ grained „ 1s. 3d. to	0	2	0
„ green „	0	0	10
Tar, per yard	0	0	2½

Plumber.			
Lead laid, per cwt.	1	14	6
Zinc, per foot, super	0	0	8
1-inch supply pipe, per foot	0	1	0
1½ „ waste pipe, &c., joints	0	1	4
¾ „ service „ „	0	0	8
Pump complete, from	4	10	0
Pan and apparatus complete, from 80s. to	4	16	0

Glazing.			
Flattened plate, per foot	0	4	0
Ground glass	0	1	8
Newcastle crown	0	1	6

ESTIMATE.—Villa proposed to be erected on the Estate at East Cowes, Isle of Wight, from the Drawings and Specification of Architect.—March, 1863.

SUMMARY.

	£	s.	d.
1. Excavator and bricklayer			
2. Mason and slater			
3. Carpenter			
4. Joiner and ironmongery			
5. Smith and bellhanger			
6. Plasterer			
7. Plumber			
8. Glazier			
9. Painter and paper-hanger			
£			

£ s. d.

The contractor is to state in his tender the difference of cost if iron cramps are used in the hollow walls, according to the common custom of the island, in lieu of Jennings's patent bonding bricks, as taken in quantities.

EXCAVATOR AND BRICKLAYER.

The concrete to be composed of four parts of screened gravel or stone, two parts coarse clean sand, and one part of fresh well burned ground stone lime, and to be thrown into trenches from a stage 10 feet high, while hot, and levelled at once.

The external walls to be carried up hollow, as described, with hard, well-burnt, and well-formed kiln bricks, and to present the appearance of Flemish bond, and the patent bonding bricks to be manufactured of a colour to correspond with the facing bricks, and the bricks to be wetted before being laid.

The mortar to be composed of one-third of well-burnt stone lime, and two-thirds clean, sharp, river or pit sand, and no more to be made at one time than is sufficient for the day's consumption.

The cement to be Roman of the best quality, and mixed in equal proportions with clean, sharp, river or pit sand, and to be made up in small quantities only as required for immediate use.

Yds.			
241		Cube.	Digging, carting and despositing on adjoining premises where directed . .
75		„	Digging, filling in, and ramming . .
68		„	Concrete . . . . .
21		Sup.	Do. 6 inches thick . . . . .
	Ft.		
	201	Run.	Strutting to perpendicular trench for concrete 2 feet deep . . . .
	38	„	Do. to perpendicular sides of hole for tank 12 feet deep . . . . .
Rods.			
14	68	Sup.	Reduced brickwork in mortar . .

Continued . . . £

Rods.	Ft.			£	s.	d.
			Continued			
1	91	Sup.	Reduced brickwork in hollow walls built in two thicknesses of one brick each, with space of 2 inches between same (measured nett), but including Jennings's patent bonding bricks at every second course, and not more than 18 inches apart, the bonding bricks to be manufactured to match the facings . . .			
5	91	,,	Do. in do. in two thicknesses, viz. the outer wall half brick, and the inner wall one brick do. do. do. . . .			
6		,,	Do. in do. in two thicknesses of half brick each, do. do. do. . . .			
	162	,,	Reduced brickwork in cement . . .			
	10	,,	Half-brick bearers do.			
	81	,,	Do. arches do.			
	41	,,	Do. trimmers do. . . .			
	270	,,	Rough cutting			
	146	,,	Two courses of plain tiles in cement .			
	4804	,,	Extra to the best picked facings, and neat flat joint pointing			
Yds.						
36		,,	Stop and twice limewhite			
132		,,	Lime and hair pugging, inch thick . .			
21		,,	Rendering in cement $\frac{3}{4}$-inch thick . .			
16		,,	Hard dry rubbish, filled in and well rammed			
126		,,	Brick flat nogging in mortar . . .			
6		,,	Brick on edge paving in cement . .			
	299	,,	Rough cut one course			
	94	,,	Rough birdsmouth cutting . . .			
	53	,,	Cut and rubbed splay			
	85	,,	Rake and point in cement to flashing .			
	3	,,	Cutting and pinning slate shelf in cement			
	365	,,	Extra to splayed footlace in moulded bricks			
			55 external mitres to do.			
			18 internal do. do.			
	15	,,	Taylor's patent damp-proof course, and laying in 14 inches wall . . .			
	160	,,	Do. do. 18 inches do.			
		22	Frames bedded and pointed . . .			
		17	Making good to window-sills . . .			
		17	Flues cored			
		25	Ends of steps, &c., cut and pinned .			
		1	Extra to forming manhole in half-brick arch, including brick curb to receive cover			

Continued . . . £

Ft.			£ s. d.
		Continued . . .	
120	Run.	4-inch metallic earthenware socket drain pipes, bedded and jointed in clay, including digging, carting, filling in, and ramming complete	
62	„	6-inch do. do. do. . .	
		Extra to No. 11 4-inch bends . .	
		Do. No. 5 6-inch do. . . .	
		Do. No. 3 4-inch junctions . .	
		Do. No. 4 6-inch do. . . .	
172	„	6-inch metallic earthenware pipe drains with patent saddles, bedded and jointed in clay, including digging, carting, filling in and ramming complete . .	
		Extra to No. 18 bends	
		„ No. 4 junctions . . .	
3		6-inch syphon taps	
15	Run.	Opening and making good ground for pipe	
8		Ends pipe made good to drain, in cement	
4		„ „ tanks, &c., in cement	
1		End of drain made good to existing drain	
1		Half-brick cesspool in cement . .	
1		Half-brick cesspool 12 inches square and 3 feet 6 inches deep in clear, built and rendered inside in cement, including York stone bottom and cover and puddling, digging, carting, and filling in and ramming complete	
		Provide water for the use of the works .	
		Give all notices and pay all fees . .	
		Insurance	
		Clear and cart away all superfluous rubbish	
		Setting only, but including all necessary fire-bricks, &c.:	
8		Register stoves	
1		Stove with holes	
1		42-inch kitchen range	
1		20-gallon copper complete . . .	
		Cut away for and make good after all trades	
		Carried to summary . . £	

MASON AND SLATER.

All the stone to be the best of its respective kind, free from vents, sand-holes, and other defects. The York to be of the hardest quality from the underbeds.

Ft.		*Portland stone:*	£	s.	d.
62	Cube	Stone and setting			
14	,,	Do. scantling and do.			
118	Sup.	Plain beds and joints			
218	,,	Do. face			
8	,,	Rough sunk work			
2	,,	Sunk joints			
69	,,	Sunk face			
27	,,	Moulding			
2	,,	Stopped moulding			
33	,,	4-inch rubbed Portland stone paving, in large stones, and joints closely fitted and set in cement			
16	Run.	Back joint			
11	,,	Rebate and back joint			
220	,,	Throat			
6	,,	Rubbed coping 18″×4″, throated both edges			
	,,	Two plain ends to do.			
	2	Mortises			
	116	Holes for balusters and running with lead.			
	8	Do. for standards do.			
	2	Stopped ends to mouldings, 3½ inches girt			
	2	Do. do. 6 inches do. .			
	4	External mitres to moulding, 3½ inches do.			
	4	Do. do. 6 inches do. .			
	2	Internal mitres to moulding, 3½ inches do.			
	17	Birdsmouth joggles, 4 inches long, and cement			
	4	Do. 6 inches long, do.			
	24	Plugs and lead			
		York stone:			
8	Cube	Stone and setting			
12	,,	Do. scantling and do.			
17	Sup.	Plain beds and joints			
7	,,	Coped edges			
37	,,	Plain tooled faces			
4	,,	Rough sunk work			

Continued . . . £

Ft.			£	s.	d.
		Continued . . .			
135	Sup.	Rough cores, &c.			
18	,,	Tooled slabs and hearths			
93	,,	Rubbed do. do.			
11	,,	3-inch paving on bressummer . . .			
201	,,	3-inch rubbed paving, jointed in cement .			
6	,,	4-inch rough cover stone . . .			
16	,,	6-inch tooled landing			
6	,,	6-inch tooled sink			
41	Run.	Back joint			
181	,,	Coped edges to cores, &c. . . .			
38	,,	Tooled sunk, weathered, and throated window sills, $8\frac{1}{2}'' \times 4''$			
8	,,	Tooled step $13'' \times 9''$, and back jointed .			
7	,,	Do. scantling, do.			
5	,,	Do. $13'' \times 9''$, rebated and back jointed .			
7	,,	Do. scantling, do.			
9	,,	Rubbed coping $13'' \times 3''$, throated both edges			
		Three plain ends to do.			
	6	Mortises			
	20	Notchings in slabs			
	22	Plain ends to window sills . . .			
	2	Do. to steps $13'' \times 9''$.			
	1	Rebated hole for trap in sink . .			
	1	Rounded corner to do.			
	10	Perforations $14'' \times 9''$, through core .			
	6	3-inch tooled templates $14'' \times 9''$ . .			
	8	Do. do. $9'' \times 9''$, with coking hole and lead to each . .			
	4	6-inch hinge stones $14'' \times 14''$, tooled fair on two sides, and including holes for claws of hinges and running with lead.			
	1	6-inch tooled, sunk $2' \times 1'\ 6''$, with rebated hole for grating			
	1	Rubbed York chimney-piece to 1ft. 6in. opening, with plain jambs, haunch-cut mantel, and wide shelf, with strong brackets under same, including cramps and fixing complete			
	1	Do. to 3 feet 6 inches opening do. do.			
	3	Enamelled slate chimney-pieces of the P. C. value of 2*l.* 10s. each, exclusive of fixing, and including cramps and fixing complete			
	4	Do. 3*l.* 10s. each do. do. .			
	1	Do. 5*l.* each P. C. do. do. . .			
		Continued . . .	£		

Sqs.	Ft.			£	s.	d.
			Continued . . .			
			Cut away and make good after all trades.			
21	10	Sup.	Best Bangor Countess slating, laid with a 3-inch lap, and nailed with two stout copper nails to each slate . . .			
	7	„	$1\frac{1}{4}$-inch, planed one side, slate shelf . .			
	4	Run.	$1\frac{1}{4}$-inch rubbed edge			
			Leave all perfect at completion.			
			Carried to summary . £			

CARPENTER.

All the timber, except where otherwise specified, to be the best, sound, and well-seasoned Baltic, Memel, or Riga, free from sap, shakes and large or dead knots.

The deals to be Christiania, and the oak of English growth.

Sqs.	Ft.			£	s.	d.
	122	Cube	Fir in plates, lintels, &c. . . .			
	744	„	Do. framed			
	96	„	Do. ground joists			
	27	„	Oak sleepers			
19	50	Sup.	$\frac{3}{4}$-inch rough deal boarding for slates .			
11	90	„	Do. sound boarding and fillets . . .			
	19	„	Inch deal boarding edges, shot and firrings			
	28	„	Do. gutter boards and bearers . . .			
	83	„	2-inch deal framed			
	177	„	Deal-framed cradling $2\frac{1}{2}'' \times 2''$ . . .			
	2	Run.	Rebated drip			
	282	„	Tilting fillet			
	21	„	Featheredge springing pieces . .			
	89	„	Rough fillet $3'' \times 2''$, spiked to wall . .			
	84	„	Herring-bone strutting			
	142	„	$2\frac{1}{2}$-inch hip, and ridge-rolls and irons .			
		19	Framed bridging pieces			
		1	Cesspool in gutter			
	76	Sup.	Centering to arches			
	41	„	Do. to trimmers			
			Continued . . . £			

£ s. d.

Continued . . .

2 Rough turning pieces to 1 foot 4 inches opening, and ½ brick sofite . . .
3 Do. 1 foot 6 inches do. do. .
1 Do. 2 feet 6 inches do. do. .
1 Do. 2 feet 8 inches do. do. .
4 Do. 3 feet 3 inches do. do. .
2 Do. 3 feet 6 inches do. do. .
1 Do. 3 feet 8 inches do. do. .
3 Do. 4 feet do. do. .
4 Do. 4 feet 6 inches do. do. .
1 Do. 6 feet 6 inches do. do. .
1 Segmental centre, 4 feet girt and 1 brick sofite . . . . . .

Provide all hoarding that may be required for the works.

Cut away for and make good after all trades.

Carried to summary . £

JOINER AND IRONMONGERY.

The framings, floor boards, skirtings, and door linings are to be of Norway deals and battens; elsewhere the joinery may be of white deals and battens, excepting the window-sills, which are to be of the best English oak.

The floor boards and framings are to be prepared immediately on signing the contract, but the framings are not to be wedged up until required for use; to be kept in some dry, warm place, and care taken that at no subsequent period they shall be exposed to rain or moisture.

The mahogany to be of the best bright quality.

Sqrs.	Ft.			£ s. d.
	9	Cube	Fir proper door cases	
4	60	Sup.	Inch deal wrought folding floor, including glued and mitred borders to the slabs .	
17	30	„	1¼-inch deal wrought straight joint floor edge nailed, and with glued and mitred borders to the slabs	
	7	Run.	¾-inch deal square skirting, 4 inches high	
			2 dovetailed angles	
			2 quadrant corners	

Continued . . . £

Ft.			£ s. d.
		Continued . . .	
120	Run.	Inch deal beaded skirting, 8 inches high, including grounds, fillets, and backings	
		22 housings	
		22 tongued and mitred angles . . .	
94	„	Inch deal moulded skirting, 8 inches high, including grounds, fillets, and backings	
241	„	Do., 10 inches high, do.	
		28 housings	
		46 tongued and mitred angles . . .	
126	„	$1\frac{1}{4}$-inch deal sunk plinth, 10 inches high, and moulding 4 inches girt, including grounds, fillets, and backings . .	
		20 housings	
		20 tongued and mitred angles . .	
48	„	$1\frac{1}{4}$-inch deal sunk plinth, 13 inches high, and moulding 5 inches girt, including grounds, fillets, and backings . .	
		8 housings	
		14 tongued and mitred angles . . .	
15	Sup.	$1\frac{3}{4}$-inch deal moulded fixed sashes . .	
8	„	2-inch deal do. do. . . .	
78	„	Deal cased frames, oak sunk sills, and $1\frac{3}{4}$-inch deal moulded sashes, single hung with brass axle, pulleys, patent lines, and iron weights . . .	
333	„	Do., do., but double hung with do. do. .	
68	„	Deal cased frames, oak sunk sills, and $1\frac{3}{4}$-inch deal moulded sashes, double hung with brass axle, pulleys, patent lines, and lead weights . . .	
57	„	Deal cased Venetian frame, oak sunk sill, and $1\frac{3}{4}$-inch deal moulded sashes, the centre part double hung with do. .	
17	„	Inch deal proper ledged door . . .	
4	„	$1\frac{1}{4}$-inch deal one panel, moulded, and square trap-door	
105	„	$1\frac{1}{2}$-inch deal four panel, moulded, and square doors	
125	„	Do. four panel, moulded both sides doors.	
42	„	$1\frac{3}{4}$-inch deal four panel, moulded, and bead flush doors	
20	„	2-inch deal six panel, moulded both sides door	
59	„	Do. six panel, moulded, and bolection moulded doors	

Continued . . . £

Ft.			£	s.	d.
		Continued . . .			
39	Sup.	2-inch deal two panel, moulded, and bolection moulded folding doors . . .			
54	„	Do. framed and beaded folding gates, filled in with $1\frac{1}{4}$-inch matched and beaded batten boarding . . .			
	1	Extra to cast-iron grating 1′ 3″ × 2′ 6″, in do.			
41	Sup.	$1\frac{1}{4}$-inch deal moulded window backs .			
27	„	Do. moulded, and flush dwarf framing .			
40	„	Do. framed and beaded dwarf closet front, and one panel moulded, and square folding doors			
116	„	Do. framed and beaded cupboard fronts, and moulded and square folding doors in two heights, the lower doors in one panel, and the upper doors in two panels each			
6	„	$1\frac{1}{2}$-inch deal, moulded, and square dwarf framing two panels high . . .			
65	„	Do. moulded, and square spandril framing (measured nett) . . .			
5	„	$\frac{3}{4}$-inch deal, wrought one side, and staff-beaded linings and backings . .			
39	„	Inch deal, wrought one side, and tongued sofite fixed with screws			
149	„	Do. wrought one side, tongued, and cross-tongued, do. do.			
91	„	Do. wrought one side, grooved, and bevilled facia fixed with screws			
136	„	Do. wrought one side, tongued, and splayed linings and backings			
43	„	Do. wrought one side, tongued, staff-beaded, and splayed, do. and do. . .			
258	„	Do. wrought, framed, and grooved grounds			
9	„	Do. water-closet seat, riser, and bearers .			
5	„	Do. beaded frame, and mitre clamped flap			
107	„	Do. wrought both sides, and cross-tongued			
19	„	$1\frac{1}{4}$-inch deal, wrought one side, tongued, and rounded window-boards and bearers			
42	„	Do. wrought one side, tongued, and moulded, do. and do.			
		Continued . . . £			

Ft.			£	s.	d.
		Continued . . .			
10	Sup.	$1\frac{1}{4}$-inch deal sunk, grooved, and return beaded apron linings and backings .			
1		Piece of do. 11 inches wide to quadrant corner 6 inches radius . . .			
1		Piece of do. to semicircular well-hole 12 inches diameter			
11	Sup.	$1\frac{1}{4}$-inch deal double staff-beaded bell-board, fixed with screws . . .			
		2 staff-beaded and mitred ends, to do. .			
195	,,	$1\frac{1}{2}$-inch deal double rebated and double beaded jamb linings			
33	,,	Do. double rebated jamb linings and backings			
22	,,	Do. double rebated and cross-tongued, do. and do.			
4	,,	Deal moulding			
25	Run.	Labour to bead			
42	,,	Do. staff-bead			
421	,,	Do. groove			
72	,,	Do. do. in oak			
3	,,	Do. rounded nosing to inch deal . .			
22	,,	Do. rebate $1\frac{1}{2}$ inches girt			
8	,,	Do. do. $2\frac{1}{4}$ do. . . .			
6	,,	Do. do. $2\frac{1}{2}$ do.			
62	,,	Deal square rebated angle staff . .			
148	,,	Rebated and beaded, do.			
17	,,	Beaded, chamfered, and mitred stop .			
10	,,	Inch deal moulded nosing			
		1 piece of do. to quadrant corner 6 inches radius			
		1 piece of do. to semicircular well 12 inches diameter			
70	,,	Inch deal narrow grooved grounds . .			
13	,,	Wrought, framed, rebated, and beaded $3'' \times 3''$			
13	,,	Wrought, framed, double rebated, and double beaded $3'' \times 3''$ . . .			
183	,,	Deal moulding 2 inches girt out of $1\frac{1}{4}'' \times 1\frac{1}{2}''$			
449	,,	Architrave moulding 3 inches girt . .			
9	,,	Deal double moulded and grooved capping out of $4'' \times 3''$			
		2 bevilled joints			
486	,,	Deal beaded and moulded architraves 5 inches wide			

Continued . . . £

Ft.			£	s.	d.
		Continued . . .			
28	Run.	Pipe casings with $1\frac{1}{4}$-inch deal rebated and beaded grounds, and $\frac{3}{4}$-inch deal clamped panels fixed with screws .			
36		Notchings			
10		Returned ends to rounded window-boards			
26		Do. to moulded do.			
6		Tongued angles to facia 6 inches wide .			
3		Shiplapped joints 12 inches long . .			
6		Mitres to moulding 2 inches girt . .			
1		Dished hole in seat			
1		Beaded do., for pull			
66		Dovetailed backings to 6-inch jambs . .			
42		Do. 11-inch do. .			
18		Wrought and chamfered shelf bearers 12 inches long, plugged to wall . . .			
24		Do. do. 14 inches long, do. . .			
1		Proper ledged copper-lid, with cut handle			
1		Plate rack 2 feet 6 inches long, three tiers in height, with inch deal rim and fixing complete			
1		Dresser 7 feet 4 inches long, with $1\frac{1}{2}$-inch deal clamped top, inch pot-board on proper bearers, proper framed legs and rails, three drawers with brass drop handles, four tiers of inch sunk plate shelves, $1\frac{1}{4}$-inch cut standards, $\frac{3}{4}$-inch matched and beaded back lining, and $\frac{3}{4}$-inch facia, with moulding at top and fixing complete			
2		Oak wrought gate stops, rounded at top, with socket let in for bolt, and digging, filling in, and ramming			
97	Sup.	$1\frac{1}{2}$-inch deal moulded treads, inch deal risers with returned ends, strong fir carriages, and glued, blocked, and bracketed			
21	,,	Do. landing and bearers			
163	Run.	Inch deal square bar dovetailed or framed balusters			
23	,,	$1\frac{1}{2}$-inch deal moulded wall strings . .			
		8 extra to ramps			
18	,,	$1\frac{1}{2}$-inch sunk, returned, beaded, grooved, cut, and mitred outer string . . .			
24		Housings to moulded steps and risers .			
17		Return moulded nosings			
17		Deal fancy cut brackets to ends of steps .			
1		Curtail end to moulded step and riser . .			
		Continued . . .			

Ft.			£	s.	d.
		Continued . . .			
		Best bright Honduras mahogany and French polishing :			
11	Sup.	Inch seat, and panelled and moulded riser and deal bearers			
6	,,	Do. beaded frame and mitre-clamped flap			
17	,,	Do. wrought both sides, tops fixed with, and including buttons and screws and deal bearers			
13	Run.	Labour to moulded edge on inch . .			
3	,,	Tongued and moulded nosing . . .			
19	,,	$\frac{3}{4}$-inch skirting, 3 inches wide . .			
		6 dovetailed angles			
		6 quadrant corners			
7	,,	$\frac{3}{4}$-inch square skirting, 4 inches high . .			
		2 dovetailed angles			
		2 quadrant corners			
6	,,	$\frac{3}{4}$-inch double moulded rail, 4 inches wide, plugged to wall			
		2 returned ends			
	3	Long notchings in inch			
	3	Quadrant moulded corners to do. . .			
	1	Dished hole in seat			
	1	Beaded do. for pull			
	1	Seat and riser, made movable . .			
28	Run.	Spanish mahogany moulded handrail $2\frac{3}{4}'' \times 2\frac{1}{2}''$, including joints and screws and French polishing			
1	,,	Level circular do. do. . .			
2	,,	Writhed do. do. . .			
3	,,	Scrolled do. do. . .			
		Ironmongery of the best description, including screws and fixing :			
	19	Pairs $2\frac{1}{2}$-inch wrought butts . . .			
	13	Do. $3\frac{1}{2}$-inch do. . . .			
	4	Do. 4-inch do.			
	7	Do. 5-inch do.			
	2	Do. 3-inch brass butts			
	1	Do. 18-inch cross-garnet hinges . .			
	2	Do. 30-inch Collinges' gate hinges . .			
	19	6-inch spring plate neck bolts . .			
	1	6-inch barrel bolt			
	6	10-inch do.			
	4	12-inch do.			
	2	30-inch do.			
	9	4-inch cupboard locks			
	5	7-inch iron rim locks with brass furniture			
	1	6-inch mortise lock with do. . . .			

Ft.		£ s. d.
	Continued . . .	
11	6-inch mortise locks, with rosewood furniture	
1	8-inch copper warded mortise lock with bronze furniture	
1	10-inch drawback lock	
2	Do. with rosewood furniture . . .	
3	Norfolk latches	
9	Brass knobs and roses	
32	Do. sash lifts	
18	Do. spring sash fastenings . . .	
6	Do. double hat and coat hooks . .	
1	12-inch brass barrel door chain . . .	
2	Iron knockers of approved pattern . .	
4	Do. dowels	
	Carried to summary . £	

SMITH AND BELL-HANGER.

	Cast iron :	
177	Run. 3-inch rain-water pipe, including nails and fixing complete	
	6 heads	
	3 double bends 1 foot 6 inches girt .	
	3 do. 2 feet	
15	„ 5-inch soil pipe, including leaded joints, tacks, and fixing complete . . .	
186	„ 5-inch strong moulded eaves gutter, including plain clips, and jointed with white lead, and securely fixing to feet of rafters complete	
	5 extra to external elbows . . .	
	1 do. to internal do.	
	6 outlets	
62	„ Railing to front fence, with wrought-iron top rail $2\frac{1}{4}'' \times 1\frac{1}{2}''$, $\frac{7}{8}$-inch cast-iron round bars 2 feet 9 inches high from coping, and 6 inches from centre to centre, with ornamental heads, as approved by the surveyor, and fixing complete	
	4 extra to $1\frac{1}{4}$-inch standards, with back stays complete	
38	Cast-iron air bricks and fixing provided .	
3	Strong tray boot scrapers and fixing .	
	Continued . . .	

		£ s. d.
	Continued . . .	
1	6-inch grating	
3	Register stoves P. C. 25s. each . .	
4	Do. P. C. 35s. each	
1	Bright register stove P. C. 6*l.* . .	
1	Strong stove, with hobs and wrought-iron bars	
1	42-inch kitchen-range, with self-acting boiler, &c., P. C. 5*l.*	
1	Supply cistern and cover, including short wrought-iron connecting pipe to boiler and brass unions, and fixing complete .	
1	20-gallon strong copper . . .	
1	Furnace door and frame	
1	Set furnace and bearing bars . . .	
1	Soot door and frame	
1	Damper	
Cwt. qrs. lbs.	*Wrought iron:*	
4 2 0	Chimney and cradle bars, and fixing . .	
1 0 14	Screw bolts and strap ties, and fixing .	
12	Stout staples and driving	
24	Dognails and do.	
12	$\frac{3}{4}$-inch screw bolts, 9 inches long, with heads, nuts, and washers . . .	
5	Balusters 1″ × 1″, and 2 feet 9 inches long, with flapped ends and fixing . .	
1	Strong wrought-iron cistern to contain 50 gallons, including fixing complete .	
	The whole of the bells to be of a different tone, and to be turned and hung in the best manner, with concealed metal tubes, stout copper wire, strong brass cranks, labels, and pendulums complete.	
6	Bells in passage, ground floor, with one rosewood lever pull to each in rooms on one pair	
3	do. do. with two rosewood lever pulls to each in rooms on ground story	
1	do. do. with ornamental bronze sunk pull at entrance gate .	
1	do. do. do. do. at entrance door	
	Carried to summary . £	

PLASTERER.

All the laths to be stout and of full thickness, and the whole of the materials and workmanship of the best quality.

Roman cement—jointed and coloured:

Yds.	Ft.			£	s.	d.
9		Sup.	Plain face			
	303	,,	Narrow face			
	26	,,	Do. and dubbing inch thick			
	323	,,	Do. in rustic quoins and dubbing			
	100	,,	Weathering			
	59	,,	Panels, and margins, and dubbing			
	691	,,	Moulding			
	227	Run.	Arris			
	182	,,	Narrow return and arris			
	25	,,	Narrow weathering and arris			
	8	,,	Do. 2 inches wide and do.			
	16	,,	Margin $2\frac{1}{2}$ inches wide			
	18	,,	Return 2 inches wide and arris			
	41	,,	Do. 3 inches wide and do.			
	113	,,	Moulding $2\frac{1}{2}$ inches girt			
	176	,,	Do. $3\frac{1}{4}$ inches do.			
	652	,,	Chamfer to rustic quoins, including arrisses			
		384	Mitres to do.			
		72	Stopped ends to moulding $10\frac{1}{2}$ inches, girt average			
		174	Mitres to moulding 11 inches, girt average			
		30	Brackets 4 inches wide on face, 1 foot 2 inches high, and 11 inches projection, with moulded fronts, having two semi-circular channels in same, and square sunk panel at top, plain sides, and including moulded caps 3 inches girt, mitred round same, and to bed moulding and modelling			
		2	Consoles 6 inches wide on face, $16\frac{1}{2}$ inches high, and 5 inches projection, with moulded fronts, enriched scroll sides, and leaf at top, including moulded caps 3 inches girt, mitred round same, and to bed moulding and frog leaves 6 inches long at feet, and modelling			
155		Sup.	Twice colour in distemper			
243		,,	Clearcole and whiten ceilings			
	489	,,	Do. do. cornices			
212		,,	Render and set			
320		,,	Render, float, and set			

Yds.	Ft.			£	s.	d.
			Continued . . .			
31		Sup.	Lath, plaster, and float			
72		,,	Lath, plaster, and set ceilings . . .			
193		,,	Lath, plaster, float, and set sides . .			
172		,,	Do. do. ceilings . .			
	35	Run.	Quirk			
	3	,,	Circular quirk			
	10		Making good to chimney-pieces . .			
	489	Sup.	Plaster moulded cornices			
	80		Mitres to do. $12\frac{1}{4}$ inches girt average .			
			Cut away for and make good after all trades.			
			Carried to summary . £			

PLUMBER.

The lead to be the best Newcastle milled lead.

Cwt.	Qrs.			£	s.	d.
20	2		Milled lead and labour on roof . .			
1	2		Do. do. in safe, &c . .			
		Ft.				
	5	Run.	Close copper nailing			
	2	,,	Soldering			
	12	,,	$\frac{1}{2}$-inch strong lead pipe, including joints, wall-hooks, and fixing complete . .			
	64	,,	$\frac{3}{4}$-inch do. do. do. . .			
	79	,,	Inch do. do. do. . . .			
	14	,,	$1\frac{1}{4}$-inch do. do. do. . .			
	4	,,	2-inch do. do. do. . . .			
	45	,,	Inch do. do. do. including opening and making good ground			
	28	,,	3-inch lead pipe, including joints and fixing complete			
		1	Rose end to do.			
		76	Lead bale tacks			
		1	Extra labour and solder to cesspool .			
		1	Lead dribble and soldering . . .			
		1	$1\frac{1}{2}$-inch lead trap, and soldering both ends			
		1	Lead trumpet-mouthed waste-pipe, 1 foot 9 inches long, $2\frac{1}{2}'' \times 1\frac{1}{4}''$ and soldering .			
		1	3-inch double bent lead socket pipe, 2 feet girth, one end soldered to cesspool, the other end made good to cast-iron down pipe			
			Continued . . .			

		£	s.	d.
	Continued . . .			
1	5-inch double bent pipe 3 feet 6 inches girt out of 7 lbs. lead, one end made good to iron soil pipe, the other end made good to water-closet trap . .			
1	2-inch brass grate and soldering . .			
1	4-inch bell grate and lead trap, and cementing			
2	¾-inch brass bib cocks, with screw bottoms and bosses and joints . . .			
1	½-inch brass ball-cock with screw bottom and boss copper ball and joint . .			
1	Inch brass roundway do. do. do. .			
1	¾-inch Jennings's patent self-closing stool cock, with brass sunk handle and joints complete			
1	¾-inch brass washer and union to iron, including hole in iron cistern, and cementing and soldering . . .			
1	Inch brass washer and union to iron, including hole in iron cistern, and cementing and soldering			
1	1¼-inch brass washer and waste, with union to iron, including hole in iron cistern, and cementing and soldering .			
1	Connection to company's main, including paying fees			
1	4-inch iron pump, with brass valves and fixing complete			
1	White glazed ware hopper and trap, including brick seating and making good to drain			
1	Jennings's patent water-closet apparatus and trap, with regulator, blue basin, opal glass handle, and fixing complete.			
	Carried to summary . . £			

Glazier.

All the glass to be puttied and back puttied and sprigged where necessary.

Ft.				
8	Sup.	Best 26-oz. sheet glass, and glazing under 2 feet sup. in each square . . .		
5	„	Do.	do.	3 feet do. . . .
21	„	Do.	do.	4 feet do. . .
6	„	Do.	do.	6 feet do. . . .
7	„	Do.	do.	8 feet do. . .

			£ s. d.
199	Sup.	Best 26-oz. sheet glass, and glazing under 12 feet sup. in each square . . .	
53	„	Do. do. 14 feet do. . .	
30	„	Best British polished plate glass, and glazing under 4 feet sup. in a square .	
7	„	Do. do. 7 feet do. . . .	
51	„	Do. do. 14 feet do. . .	
		Leave all perfect at completion . . .	
		Carried to summary . . £	

PAINTER AND PAPERHANGER.

All the work to be previously knotted and stopped.

Yds.	Ft.		£ s. d.
462		Sup. Four times in oil, approved tints . .	
	622	Run. Skirting and strings	
	48	„ Do. 18 inches girth	
	87	„ Margins	
	28	„ Pipe casings	
	148	„ Angle staff	
	177	„ Balusters	
	186	„ Eaves' gutter	
	177	„ Rain pipe	
		6 heads	
		38 Air bricks	
		3 Scrapers	
		1 Pump	
		10 Dozen large squares	
		18 Frames	
		3 Two light frames	
		1 Venetian frame	
26		Sup. Extra to graining in imitation of wainscoat, and twice varnishing . . .	
		5 Dozen large squares	
		18 Frames	
		3 Two light frames	
		1 Venetian frame	
		10 Pieces of paper at 1s. 6d. per piece, P. C., and hanging same cut close . .	
		38 Pieces of paper at 3s. per piece, P. C., do. do. do. . . .	
		Preparing and sizing walls for No. 48 pieces of paper	
		Clean all glass, and clean and scour down all floors, paving, &c., at completion .	
		Carried to summary . £	

V.—*Specification of Works to be done in erecting and completely finishing a* VILLA, *to be erected on the Estate belonging to the , with all the necessary appurtenances, at .*

List of Working Drawings.

Front elevation . . .	A
Back elevation . . .	B
Side elevation . . .	C
Basement plan . . .	D
Ground-floor plan . .	E
First-floor plan . .	F
Transverse section . .	H

Enlarged sections and details to be supplied as the work proceeds.

BRICKLAYER AND EXCAVATOR.

Excavate the ground to the depth required for the foundations of the walls, and for the cellars, areas, cess-pools, and drainage.

Remove and cart away all superfluous earth and rubbish, disposing of the whole or any of the same on the ground adjoining the intended building, or as directed, if required for levelling or any other purpose.

As the brickwork rises, fill in and ram the earth close up to the walls, until the trenches are filled up to the level of the ground, or to any levels required by the surveyor.

The trenches for the reception of the concrete to be made at the bottom perfectly level, and solid and hard (by punning if required) throughout.

The superfluous earth, &c., to be removed as it accrues, without being allowed to accumulate.

To excavate the ground for the front boundary walls,

Nº 2.

VILLA AT EAST COWES.



ELEVATION.



SECTION.

SCALE OF FEET.

10 9 8 7 6 5 4 3 2 1 0 10 20

Newbery & Alexander, Lith.
62, Castle Street, Holborn.

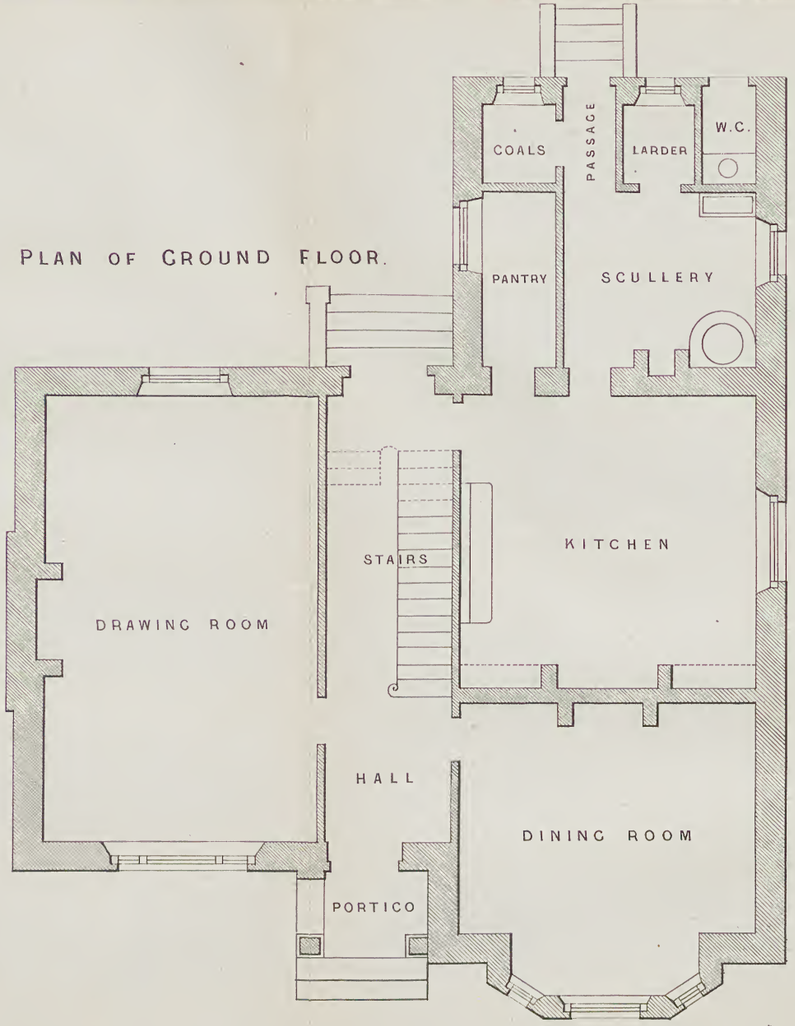
E. & F. N. Spon, 16, Bucklersbury, London.

VICTORIAN RAILWAYS
GENERAL LIBRARY

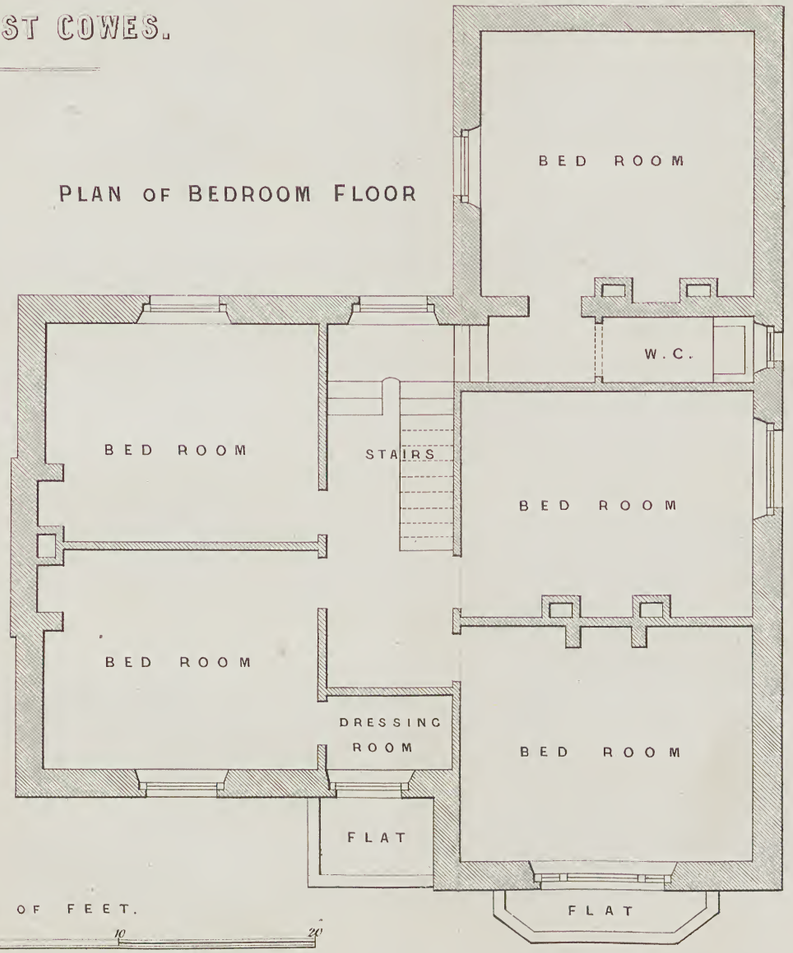
No 2.

VILLA AT EAST COWES.

PLAN OF GROUND FLOOR.



PLAN OF BEDROOM FLOOR



SCALE OF FEET.

10 9 8 7 6 5 4 3 2 1 0 10 20

Newbery & Alexander, Lith.
45, Castle Street, Holborn.

E. & F. N. Spon, 16, Bucklersbury, London.

VICTORIAN RAILWAYS
GENERAL LIBRARY

and for such other walls and works as may be specified, performing all the necessary works in the manner already described.

CONCRETE.

The gravel or stone to be used for the concrete to be screened, quite clean, through a screen with meshes gauged to half an inch; and no stone larger than an egg to be used.

The concrete to be formed in the following proportions: four parts of screened stone as above, two parts of coarse clean sand, and one part of fresh well-burned lime.

The lime to be ground to powder, dry; the materials in a dry state to be then mixed together, and sufficient water to be added to so much of the material as can be used at once to give the mass the consistency of mortar.

As the concrete is prepared, it must be immediately thrown into the trenches from a stage 10 feet high from barrows, and puddled to a level surface. Or if thrown in from the level, must be well trodden to an uniform level surface at top for the reception of the intended brickwork. The concrete throughout to be of the width and thickness shown in the section.

BRICKLAYER.

The mortar used in the works to be composed of one-third of well-burnt stone lime, by measure, and two-thirds of clean, sharp, river, or pit sand, well mixed and incorporated. No more mortar to be prepared at a time than will be required for one day's consumption, and no sea sand to be used in making it.

The quick lime to be covered with sand, &c., and not more exposed to the atmosphere than is absolutely necessary.

Roman cement to be used wherever external cement work is necessary, or specified, or for interior work, such as the linings for cisterns, &c.

The Roman cement is to be of the very best quality, and pure from the manufactory, and, before being used, to be submitted for the approval of the surveyor.

The cement to be gauged with an equal proportion of sand, and in small quantities at the time of using. If more should be prepared than can be used at once, it must be thrown away as useless, as, after it is set, it will on no account be allowed to be broken up and re-mixed with water, or fresh sand or cement.

The cement and sand must be first thoroughly mixed when dry, water being added in due proportion as it is required.

Great care must be taken not to disturb any brick or tile work that may be set in cement after the cement has set.

The utmost attention is to be paid to the quality of the lime, the purity of the sand, and the proportions used in making the mortar, and equal care in the preparation of the cement.

BRICKWORK.

The footings to the walls to be in three courses, contracting at each course 5 inches—that is, $2\frac{1}{2}$ inches on each side.

The walls to be carried up according to the thickness marked upon or indicated by the drawings, and no four courses of brickwork to rise more than 1 foot, including mortar joints.

The bricks used in the external and thicker walls to be hard, well-burnt, and well-formed kiln-burnt bricks, those for the external walls, particularly the front, to

be picked of uniform tint and colour. The bricks for thinner internal walls and brick nogging may be hard, well-burnt, and well-shaped place bricks.

The external walls, at the option of the contractor, may be built with solid or machine-made perforated bricks.

Taylor's patent damp-proof course must be used throughout the entire thickness of the walls at the ground line, of widths suitable to the thickness of the wall to be carried.

The foundations below the damp-proof course to be built solid, but above the same, all walls of greater thickness than ½ a brick or 4½ inches, and being external walls, must be built hollow; that is to say, that in a wall, if built solid, would be 9 inches in thickness, there shall be an air space of the clear width of 2 inches between the two walls of 4½ inches each; and that in a wall, if built solid, would be 14 inches thick, there shall be a clear air space of 2 inches between the outer 4½ and the inner 9-inch wall; and that in a wall which, if built solid, would be 18 inches in thickness, there shall be a clear air space of 2 inches between the two 9-inch walls.

In order to insure the proper carrying out of such hollow walls, Jennings's patent bonding bricks shall be used in manner following; that is to say, that in the horizontal courses of brickwork for all external walls, Jennings's patent bonding bricks shall be used, not more than 18 inches apart, and that vertically they shall be used in every second course in height; and in order to insure the proper performance of the work, the printed illustrated sheet, describing the use of the said patent bonding bricks, and Taylor's patent damp-proof course, has been incorporated with, and forms part of, this specification.

Externally the walls shall be carried up so as to present the appearance of Flemish bond; the said patent bricks shall be manufactured of a colour to match with the face bricks, and to insure perfect uniformity in this respect, the contractor for these works shall supply to the manufacturer of the patent bonding bricks a solid brick, as a specimen of the colour of the bricks to be used in the external walls, and particularly for the picked bricks for the front.

The joints in the brickwork to be drawn perfectly straight, and to be neatly flat pointed throughout the whole of the external walls.

Throughout the buildings, over all the internal and external openings, throw 9-inch rough or dressed arches, as the case may require; in all cases to be formed of two separate courses of $4\frac{1}{2}$-inch bricks laid close, and radiating to a common centre, and upon proper wood-framed and lathed centre pieces. The arches to be carried through the whole thickness of the walls, and above lintels, where lintels are required.

Over all the chimney openings build 9-inch arches in separate rims, upon properly cumbered wrought-iron bars $2\frac{1}{2}$ and $\frac{1}{2}$ inches. The bars to be 15 inches longer than the widths of the openings, and properly turned and corked into the jambs at the ends.

Carry up the chimney shafts according to the drawings, properly turn parget and core all the chimney flues with cow dung, and lime, and hair mortar mixed. The smocks of the flues to be all carried up in solid brickwork, and in no case less than $4\frac{1}{2}$ inches thick, exclusive of the core; no woodwork to be placed in the brickwork of the chimneys, nor nearer than 9 inches to the same.

The projections to the cornice to porch, projections to main cornice and chimneys, strings, mouldings, and

salient courses to be formed in brick or tile, and set in good mortar, ready to receive the Roman cement, mouldings, and dressings. The cantilevers to be worked in tile or brick, ready to receive the cement covering and mouldings.

Under the drawing-room, sitting-room, entrance-hall, and such other rooms and passages on the ground floor, and not over the cellars, build, for supporting the floors, dwarf walls 4 feet apart, and 9 inches in thickness, with proper footings in three courses, one brick high each, the bottom course being 18 inches wide.

Bed in mortar all wood bricks, plugs, templets, dragon pieces, wall plates, lintels, and all other woodwork to be set in the brickwork, and so requiring, wall plates $4\frac{1}{2} \times 3$ to be placed under the joists of each floor, each in a complete tier halved and lapped at the ends. Bed upon the dwarf walls, for supporting the lower floors, oak bearers $4\frac{1}{2} \times 3$.

Over all internal and external window openings insert lintels, as mentioned under the head of carpenters' work.

Insert all iron and stonework required to be set in the brickwork.

Execute splays, birdsmouth skewbacks, and chamfers, and cut all channels and holes for bell fittings, pipe fittings, and do generally all cutting, setting, and jobbing for other trades; fill in all putlog holes, and execute salient courses, corings, and dubbings, carefully matching all such fillings and finishings as are required to previous work.

Build 9″ fenders in brickwork, with proper footings to basement fireplaces, and brick-trimmer arches ($4\frac{1}{2}$) for supporting chimney slabs to all the other floor chimney places throughout, well grouting the same.

Fill up interstices, and point round in lime and hair mortar all door frames and all window frames.

Build dwarf walls for supporting all slate or stone slabs in cellars, kitchen, larder, and pantries; do all requisite brickwork to sinks and copper in kitchens, and for setting grates in fireplaces throughout.

Fit up in the scullery a strong 20-gallon copper in brickwork in the best manner, with furnace and door damper, and circulating flue complete, finished with hair mortar.

Finish the chimneys with tile, salient courses, and brickwork set in cement.

Provide sufficient safe standing, scaffolding, poles, planks, putlogs, ladders, blocks, pulleys, ropes and tackle, and implements of every kind requisite for the proper completion of the whole of the works. The scaffolding to be left standing until the buildings are ready to be rendered up as complete.

Build areas to breakfast-room, kitchen, and staircase to basement with 9″ raking walls, and area, upright walls, with proper fittings, to steps leading to basement; the areas to be paved with stone at bottom, the top of the walls of the areas to be covered with stone, and the kitchen and staircase area to be covered with strong iron gratings.

The bricks to be wetted before being used, and the mortar must be used as stiff as possible, but the bricks must be protected from excessive rain. The bricks for interior walls should be wetted with lime water.

All the timber partitions to be filled with brick nogging set in mortar, the bricks being filled in in horizontal courses.

Erect a front boundary wall, according to the drawing to be supplied, with piers, gates, and every requisite fitting as shall be described on such drawing.

Build a wall as shown on drawing, for supporting the steps and superstructure of the porch, carrying up the

pilasters and wall projections in solid brickwork in cement, with proper set offs, &c., for receiving cement mouldings.

MASON.

All the stone used to be the best of its kind, as specified, free from vents, sand holes, streaks, and other defects. The York or Purbeck paving steps, &c., to be the hardest quality from the under beds, and the Portland stone from the best quarries.

The mortar and cement to be as specified for the brickwork and plasterer's work. Lime, putty, and plaster to be used where the class of work requires them.

The masonry is to be worked and put together in the best manner, with all requisite sinkings, throatings, drips, joggings, &c.; all that is not described as tooled is to be rubbed fair and carefully worked.

Provide and set in Roman cement, with neat, close joint, $9 \times 4\frac{1}{2}$, tooled and chamfered, York or Purbeck coping to areas.

Pave the porch with rubbed and polished Portland stone, bedded close, firm, and level, and provide rubbed, polished, and front moulded Portland steps to same, the paving not to be less than 4 inches thick.

Put to all the front windows wrought, sunk, and weathered, and 4″ thick polished York stone sills, with polished stone trusses to same, as shown in drawings.

To all the other windows throughout put wrought, sunk, and weathered York stone sills, tooled as fair as possible.

Pave the pantry, larder, passages, scullery, coal-cellar, and cellar with 3″ York stone boasted paving, laid flat on sand, and joints run with liquid cement. Provide boasted York steps to external flight of steps to area and

water-closet, paving same with stone, as before described for scullery, &c.

Fit up in the scullery a sink, as shown in the drawing, properly sunk and tooled fair, sunk for bell trap, and pierced for waste pipe.

Provide and fix a proper brass bell trap to sink, with fittings complete.

The stairs to basement floor, with the windows, to be formed of York or Purbeck stone, securely fixed at least 4½ inches into brickwork, and dowelled to receive iron balusters, as hereafter described; securely fix the balusters with lead.

Put to the kitchen and breakfast-room hearthstones and back hearths of York stone, tooled fair, the hearthstones to be 18 inches wide in the clear, and 15 inches longer than width of the respective chimney openings.

Cope the parapet wall to the front bay window, and the parapet to the porch, with Portland stone coping, 4″ thick, moulded and wrought according to the drawings, joggled at the joints with stone joggles set in cement, the joints to be well filled with cement, and the coping bedded in cement.

Put to the drawing-room a hearthstone and back hearth of white-veined marble, polished, the hearthstone to be 18 inches longer than the chimney opening, and 2 feet 6 inches in width.

Put hearthstones and back hearths of polished York stone to breakfast-room, parlour, library, and dining-room; hearthstones 18 inches wide, 15 inches longer than chimney openings are wide, and the same kind to all the bedrooms.

Fit up to kitchen fireplace a tooled York hearthstone, 1′ 6″ wide, and 1′ 6″ longer than the width of the fireplace, with back hearth of same kind. Fit up to kitchen

a York rubbed stone chimney-piece, with jambs, lintel, and wide shelf, the shelf to be supported on strong wrought and rubbed stone brackets.

Fit up black enamelled slate chimney-piece, with consoles for supporting shelf, with iron holdfasts complete, value 65s. The same in the library.

Fit up enamelled slate chimney-piece in drawing-room complete, value 5*l.* 10s. In dining-room and parlour enamelled slate chimney-pieces, value 2*l.* 5s. each.

Fit up in all the bedrooms enamelled slate chimney-pieces, value 1*l.* 10s. each.

Provide labour, cement, putty, iron holdfasts, and all other requisites for properly fitting and fixing the chimney-pieces, hearthstones, and appurtenances.

Provide York stone templets, keys, cappings, and other stone and labour, also cramps, leads, and cement, and cut all holes, mortises, rebates, chases, grooves, and execute all other jobbings necessary for the perfect completion of the stonework and other branches of work where the aid of a mason may be requisite.

Put terra cotta balusters to top of bay windows, as shown in the drawings, of approved pattern, well burnt, and clean.

Pave the kitchen, scullery, coal-place, cellar, passages, pantry, larder, and servant's water-closet with tooled York or Purbeck stone, with straight edges, properly laid and bedded on sand, with grouted joints.

Pave the bottom of areas to cellars with York boasted stone, 3″ thick.

The paving of the scullery, which is of stone, the cellars, areas, &c., to be slightly inclined, sufficient for water to flow over one part of the same, where a grate and gully in each room must be provided for carrying off

the water to the drains. Each gully to be fitted with a strong iron gate, let in, sunk, pieced, and boasted York stone flag.

A 9-inch metallic earthenware pipe drain, with patent saddles, to be laid from the different gulleys in the floors, at a proper inclination, to some outside drain or ditch, fitted with proper syphon metallic earthenware traps at the gulleys. This drain not to be connected with cesspool, or water-closet, waste pipes, or drains, and if laid into the general drainage or sewerage, to be trapped before entering same. The contractor to provide for putting down feet run of such pipe drain if required, and where required by the surveyor. No drains to be covered or filled in until they have been inspected and approved by the surveyor.

CARPENTER.

All the timber used, except otherwise specified, to be of the best, sound, and well-seasoned Baltic, Memel, or Riga fir timber, free from sapwood, shakes, and large dead knots.

The deals to be from Christiania, and the oak of English growth, sound, well seasoned, and close grained.

The joists to the breakfast-room floor to be $5'' \times 3''$, notched upon and nailed to oak sleepers 4×3, which are to be bedded on dwarf casement walls.

None of the joists, rafters, or quarters to be respectively more than 12″ apart, or 14″ from centre to centre.

In all cases, the trimmers and trimming joists to be $\frac{1}{2}$ an inch thicker than the common joists.

Three tiers of wall plates 4×3 to be inserted in the walls, as specified under the head of brickwork.

The joists of the ground floor to be yellow deal

battens 8″ or 9″ × 2½″ or 3″, securely notched to wall plates and heads of framed partitions, and to have proper trimmers and trimming joists.

The joists to the first floor to be yellow deal battens 8″ or 9″ × 2½″ or 3″, notched upon wall plates and heads of quartered partitions, and to have proper trimmers and trimming joists.

In each case the floors to be bridged with herring-bone strutting, one row at least down the centre of each room, and two rows in the larger rooms.

The roof to the main building to have pole plates 5″ × 3″, wall plates 4 × 3, rafters 4 × 2¼, purlins 5½ × 4, couples 9 × 3, strutts 4 × 3, ridge pieces 6 × 1½, hip pieces 6 × 2, all securely framed. The rafters to be firmly notched and nailed to purlins, pole, and wall plates, and nailed to ridge and hip pieces. Where couples are used they are to be securely nailed to the rafters, and the rafters to which the couples are nailed to be 5 × 3. The purlins to be securely notched into the couples.

Feather-edged gutter boards of inch stuff to form the bottom of the gutters, with side gutter boards of ¾ stuff nailed to the rafters; cross bearers to be put under the gutter boards 3 × 2 and nailed to rafters, the gutter boards being nailed to the cross bearers. The side gutter boards to be 9 inches wide, the gutter boards to be at least 6″ wide at top, gradually increasing in width towards the eaves to 9″, 12″, or 15″, as the length of the gutter may require.

Put to the projecting eaves moulded and planed facia and soffit boards securely fixed to ends of joists, as shown in the drawings.

All the roofs to be covered with ¾-inch rough boarding, securely nailed to rafters, for carrying the stakes.

The ceiling joists to be 4 × 2½, nailed to bearers 6 × 3,

and fixed upon wall plates at ends and the tops of quartered partitions.

The quarter partitions throughout to have heads and sills $3 \times \frac{1}{2}$, door jambs and heads $3 \times 3\frac{1}{2}$, cross pieces $3 \times 3\frac{1}{2}$, all properly framed with quarters $2\frac{1}{2} \times 2\frac{1}{2}$, strutts $2\frac{1}{2} \times 2\frac{1}{2}$.

Put strong rebated and beaded angle staves to the chimney breasts in the principal rooms, which may be painted instead of being papered, and the same kind of staves to all projecting angles. Put square angle staves to all the rest of the chimney breasts.

Put lintels over all the internal and external openings 5×4, and 15 longer than the width of the respective openings. In the thicker walls, two lintels 4×4 to be used, instead of one only.

Provide and fix all temporary hoardings and enclosures that may be necessary, and all centres and turning pieces for arches.

Fix all fillets that may be required, and all tilting fillets for the proper performance of the slating; nail to the trimming joists skew pieces for the brick-trimmer arch to spring from.

Provide and fix proper strong fir bearers for carrying cistern to supply water-closets, &c.

Upward currents from space under boarded floors to first-floor story to be prevented by laying in rough boards upon laths nailed inside of joists not less than $\frac{1}{2}$ inch thick crossways, to receive pugging or a layer of coarse plaster.

Construct in the best manner the works in the carpenter's branch that are set forth in the specifications and drawings, so as to avoid failure from thrust or settlement, using all necessary wall plates, templets, bonds, wood bricks, joists, frames, quarters, posts, sills, heads, braces, strutts, lintels, ceiling joists, common

rafters, hip volley and ridge ditto, purlins, angles, ties, stays, shoes, pins, plugs, blocks, plates, ferrings, bolts, spikes, nails, wall hooks, straps, and other requisite materials, and performing pinnings, mortisings, furrings, jogglings, notchings, housings, and all other requisite operations for making the works complete; but no more timber to be introduced into the walls than is absolutely necessary for the proper execution of the design.

Construct roof over porch with joists 6×3, wall plates $4\frac{1}{2} \times 3$, covered at top with rough boarding $\frac{3}{4}$ inch thick, with proper tilting fillets and sides to form gutters; the joists to be pieced at top to give a slope to gutters.

Construct the flat roof over bay window with joists 4×3, wall plates 4×3, covered with inch boarding for leadwork, with properly formed gutters.

Fit up to basement, water-closet, and lobby to same, scullery, cellar, pantry, and larder solid beaded door frames with sills 3×3, securely fixed to wood bricks in walls.

All the floor boards to be $1\frac{1}{2}$ inch, laid folding, perfectly close and straight at edges, and securely side nailed to joists. None of the boards to be more than $4\frac{1}{2}$ inches wide.

JOINER.

The framing, floor boards, skirtings, and door linings are to be of Norway deals and battens; elsewhere the joinery may be of white deals and battens, excepting the window sills, which are to be properly wrought, and of the best English oak throughout.

The floor boards to be prepared immediately the contract is signed, the framing also to be commenced immediately, leaving the works to be wedged up as wanted; to be kept in some dry, warm place, and care taken

that at no subsequent period they shall be exposed to rain or moisture.

The whole of the framing, before leaving the shop, to be knotted with red lead.

All the floor boards to be $\frac{7}{8}$ inches; all to be straight joists, except in inferior rooms and offices, which are to be laid folding, securely edge-nailed to the joists.

All hearths to have clean mitred, tongued, and glued margins, $2\frac{1}{2}$ inches wide by the thickness of the floor boards.

Proper fir bracketings, grounds, and blockings, to be provided and fixed for all joinery.

The skirtings in the drawing-room to be 13 inches high, in two pieces besides the mouldings, properly blocked, rebated, and glued, so as to show a recessed facia below the mouldings; the mouldings to be bead and quick ogee.

The skirtings in the breakfast-room, dining-room, parlour, library, hall, and staircase to be 10 inches high, sunk and moulded; all the skirtings to be grooved to receive plaster.

The skirting to the kitchen, pantry, store-room, and passages to be 8 inches high, with bead and quick top, rebated to receive plaster at back; a back lath to be put round at back of all skirtings to stop the plaster work.

Put to the hall door solid $4\frac{1}{2} \times 4$ deal frame, chamfered at exterior edge, beaded at back, rebated to receive door, grooved for plaster, and framed for fanlight over; put 5-inch moulded architrave round inside. The mouldings to be beaded quick, ogee mouldings throughout the joiners' work, and all the work throughout to be properly smoothed and planed, knotted, and stopped.

The front door to be formed in two halves, folding, beaded, and rebated, with two panels in each half; the

top panel to be strong plate glass, both panels to be surrounded with raised mouldings. The door to be formed of 2-inch stuff, each half to be hung with three 5-inch strong iron butt hinges, fitted with two (four for both halves) strong iron barrel bolts and sockets, a 12-inch iron rimmed strong lock, with brass and rosewood furniture, fastening chain, and two iron knockers of approved pattern, inside the frame to have moulded 5-inch architraves.

The basement door to passage to be solid framed, frame 4 × 3, beaded, and framed for fanlight over, with outside ogee moulding round frame. The door to be $1\frac{3}{4}$ bead and flush, strongly framed, hung with three 5-inch strong iron butt hinges, fitted with two 10-inch barrel bolts and sockets, and fitted with a strong 12-inch iron-rimmed lock, and Norfolk thumb latch.

All the doors opening to the hall or passage to be six-panel, both sides, moulded doors. The doors to the drawing and dining-rooms to have raised mouldings inside; to have rebated and beaded $1\frac{1}{2}$ linings in width, equal to full thickness of wall and plastering, to be grooved to receive plaster, and beaded on outer edges, well framed, and wedged up. To have on both sides 5-inch moulded architraves. Put between drawing-room and dining-room folding doors, each with 6 panels, both sides moulded, framed of $1\frac{1}{2}$-inch stuff, strong linings, beaded and rebated, and 5-inch moulded architraves each side. All the doors to be hung with two 4-inch iron butt hinges, and fitted with strong mortise locks, and brass and hard wood furniture. In addition, the folding doors on one side to have two conterssunk brass bolts top and bottom for fastening same.

Fit up washing place on first floor with blue delf basin, inch beaded mahogany top, with mahogany ledging to walls 3 inches high, fitted with doors in frame

underneath, moulded, hung with butt hinges, and proper catch and button fastener.

Fit up the water-closets with mahogany front, moulded inch seat, inch mahogany beaded margins, clamp inch mahogany flap, $\frac{3}{4}$-inch ledgings, 4 inches high, round walls placed on strong framings, with proper fittings and hinges. The riser to be of deal, with $1\frac{1}{4}$ stuff, and moulded and panelled. The closet to be fitted with Jennings's patent blue delf basin and trap, with proper countersunk handle levers and machinery complete. The lobby, washing place, and water-closet to be skirted same as passage and hall.

The outer kitchen door to be 2-inch four-panel door, hung with three 4-inch iron butt hinges, fitted with two strong iron barrel bolts or socket bolts, with springs at back, a 12-inch strong iron-rimmed lock, with brass furniture and a fastening chain. The frame previously described to be solid, and framed for fanlight on top. Fit up the door to breakfast-room with $1\frac{3}{4}$ six-panel door, both sides moulded, door with $1\frac{1}{2}$-inch beaded and rebated linings, and 5-inch moulded architraves both sides. The kitchen door opening into passage to be six-panel door, moulded on passage side, and with 5-inch moulded architraves on that side to match with breakfast-room door, linings the same; both doors to have two 4-inch butt hinges, and strong mortise locks, with brass and hard wood furniture. All the other doors in the basement to have $1\frac{1}{2}$-inch rebated and beaded linings, with 4-inch moulded architraves, where they open to passages or staircase. All the doors to be four-panel $1\frac{1}{2}$-inch doors, moulded on sides towards passage or staircase; all hung with two 4-inch iron butt hinges each, and fitted with strong mortise locks and brass furniture.

Fit up $1\frac{1}{4}$ framed fronts to two small closets in kitchen,

with inch panel outside moulded doors. The frames to be made for two sets of doors each, the lower doors opening into closets for iron pans, &c., which are to have inch-grooved tops, the upper doors into closets, which are to have three rows of inch shelves of full width of closets, fitted upon strong wood brackets, the doors to be made folding, hung with strong iron butt hinges, and fitted with good strong locks, brass handles, and inside bolts.

Fit up in the kitchen on side opposite fireplace a six-shelved ledged frame and top-moulded delf rack, with shelves at proper distances for dishes and plates.

Fit up in kitchen proper bell board for hanging bells, and also bracket board for twelve strong iron lacquered brackets, which are to be procured and securely screwed thereto for dish covers, &c. Fit up in hall a mahogany-edge moulded bracket board, fitted with brass-lacquered strong iron brackets screwed to board.

Fit up in pantry three rows of inch deal shelves on strong wood or iron brackets 12 inches wide.

Fit up similar shelves, &c., in storeroom.

All the windows in basement, excepting the kitchen and breakfast-room windows, to have solid frames, with sunk and wrought oak sills, the casements to be $1\frac{3}{4}$, hung to frames with two 3-inch iron butt hinges each, and to have proper inside fasteners. The windows to kitchen and breakfast-room to be deal cased, with sashes double hung as described for first-floor windows, with inside linings, moulded architraves, and window boards complete.

All the external windows to have strong wrought and framed fir cases, moulded outside, and $1\frac{3}{4}$ double-hung ovolo sashes, oak sunk and weathered sills, sashes hung with white patent lines, and fitted with brass runners and fasteners and iron weights complete. Fit up

moulded and panelled linings and soffits with ebony handles to imitate boxed shutters, the linings to be properly framed, and surrounded with 5-inch beaded and moulded architraves. The architraves to be continued to the floor in all the principal rooms, to have rounded and moulded window boards, the space or dado under window board to be framed, panelled, and moulded.

Fit up water-closet in basement with deal seat on strong fir carriages and deal riser, a white delf basin, countersunk place for handle and socket, and closet fittings complete. The doors to lobby and closet to have solid 3×3 beaded frames with $1\frac{1}{2}$-inch four-panel doors, hung with two 4-inch iron butt hinges each, and each fitted with mortise locks and brass furniture.

Fit up to the bedrooms, passages, and staircase to bedroom floors with 10-inch moulded skirtings, grooved at back for plaster 1 inch thick, mouldings to project.

All the doors to the bedrooms and water-closets to have $1\frac{1}{2}$-inch rebated and beaded linings, with 4-inch moulded architraves inside and out. The doors to be $1\frac{1}{2}$-inch four-panelled, both sides moulded, hung each with two $3\frac{1}{2}$-inch iron butt hinges, and fitted with strong mortise locks and brass and hard-wood furniture, the water-closet doors to have inside brass bolt additional.

The floor boards and margins to chimney places to be same as described for ground floor.

STAIRCASE.

The staircase throughout to be fixed on strong deal carriages, notched to receive the steps. The steps to be formed with inch risers and $1\frac{1}{2}$ inch treads, moulded and rounded in front and return, those of the first flight, from the ground floor to the bedrooms, to have neat brackets, as shown on the drawings. To be properly

backed, glued, and securely put together. The handrail to the first floor to be of Spanish mahogany, wrought, moulded, and polished. The baluster to be inch square deal, with occasional wrought-iron balusters for strengthening the same. The bottom steps to have compass end glued and bracketed, with carved handrail, as shown in drawings, the handrail from the first floor to attics to be stained birch or Honduras mahogany, wrought and polished, with turned newels.

Raking facia boards beaded to be put to staircase sides and round the wall spaces, and moulded skirting board for wall sides from top to bottom.

The space to cellar steps to be partitioned off with $1\frac{1}{4}$ panelled and moulded partition, as shown in drawing. Fitted with moulded door, with frames, architraves, and fittings, as described for other doors.

The cellar stairs to have wrought-iron handrail and balusters securely fixed with lead into steps.

Execute all other work necessary for the perfect completion of the joiner's work in every respect.

PLASTERER.

Execute in cement the plinths, quoins, strings, mouldings, cornices, caps, panels, trusses, spandrels, segment arches, and main cornice, &c., as shown in front and side elevations. All the mouldings to be sharply and neatly executed, and according to the drawings and to such enlarged drawings and sections as may be afterwards supplied. The channels in the quoins to be neatly executed, and the quoins returned at the angles.

The chimney caps and bases to be executed as shown in the drawings.

The cement to be prepared and used as described in the specification for bricklayer's work.

Lath, plaster, set, and whiten the ceilings to the principal rooms, passages, and porch.

Lath, plaster, and set all the other ceilings throughout.

Render float and set all the walls throughout the principal rooms and passages, and render and set all the walls to the other rooms throughout, soffits to staircase to be executed in the same manner as the principal rooms and passages.

Execute in the best manner clean, sharp-moulded cornices to all the principal rooms, passages, and porch on the ground and first floors, including breakfast-room in basement, according to the drawings, or such other drawings or sections to a larger scale that may be supplied.

Lath, plaster, and float all the ceilings to the basement, excepting to breakfast-room, which is to be executed in the same manner as the first floor bedrooms, and render and float the walls throughout.

Lath, plaster, float, and set the timbered partitions throughout, and soffits of staircase.

The plasterer's work to include all cutting of moulds for running cornices, and rubbing and bracketing where necessary.

The plaster and hair must be very well mixed together, and sufficient time allowed for their amalgamation, the lime to be well ground.

Cement filleting to be used wherever necessary, and carefully executed.

No labour must be spared in working the face, so as to prevent blistering and crackings after work is done.

The plaster cornices to be carefully worked in every respect, and neatly mitred at all salient and re-entrant angles; the returns setting off truly at right angles, unless otherwise intended. Render smoothly the brick sides, &c., of fireplaces, and rough render behind windows, shutter-boxings, and other linings.

Provide all moulds, and do all dubbing out, also all repairs at completion.

Lay in between the joists of boarded floors, boards $\frac{3}{4}$ inch thick, on which spread a coat of coarse plaster 1 inch thick.

SLATER.

Cover the roofs with Bangor countess slating, each slate to be secured with two strong composition nails. The slates to be laid to proper gauge, and to overlap at edges at least 4 inches; no slips to make bond to be used.

Put Welsh made strong slate-stone cisterns, grooved and bolted together with strong wrought-iron rods, properly pierced for waste, closet, and other pipes, over each water-closet, each cistern capable of holding sixty gallons.

Put polished stone slabs in pantry, on one side and end, 15 inches wide.

PLUMBER.

Cover the ridges and hips with lead 5 lbs. to the foot, 15 inches wide. Form the valleys with lead of the same weight turned up 12 inches under the slates.

Flash round the chimneys with step flashing, well secured into brickwork and to slate battens, 15 inches wide and 5 lbs. to the foot.

Cover the roof of the bay-window outside water-closet and porch with lead 5 lbs. to the foot, with all necessary rolls and lead nails.

Put to the eaves strong 5-inch moulded cast-iron jointed gutters, jointed with white lead, and securely fixed upon strong wrought-iron brackets.

Put strong iron down pipes with cistern heads from principal roof at proper places, roof to bay-window and porch securely fixed to walls, and connected with drains at bottom.

Lay the water on from the town waterworks with lead or galvanised iron pipes, of sizes approved by the waterworks company, to the cisterns, sinks, kitchen, and scullery.

Put 2-inch strong waste pipes from sinks to drains.

Put proper soil and water pipes of iron from water-closets to drains.

Do all other necessary work of the nature of plumber's work requisite for the buildings in every particular.

Put lead in a proper manner wherever it is obviously necessary to make the roofs water-tight, the water supplies and discharges all secure and water-tight, using all solder, wall hooks, holdfasts, brackets, lead, capped nails, and tacks that may be wanted to carry out in a complete and proper manner all the plumber's work.

GLAZIER.

Glaze the bay window, front window to parlour, with strong polished plate glass; the same to fanlight over front door; and all the other windows and fanlights with the best Newcastle crown glass, properly bedded, bradded, and back puttied.

IRONFOUNDER.

Fit strong cast-iron gratings over all the areas, securely fixed into the stonework with lead.

Provide and fix baluster and handrail of wrought iron to cellar staircase, as described under the head of joiner's work.

Provide cast-iron strong tray boot scrapers to front and back doorways.

Fit up a close 38-inch range in kitchen, with self-acting boiler, &c., complete, of the value of 4*l.* 15s. cost price.

Fit up in drawing-room bright register stove grate, of the cost price of 3*l.* 15s.

Fit up in dining-room, parlour, library, and breakfast-rooms register stoves, cost price 35s. each.

Fit up in bedrooms register stove grates, value 30s. each.

Provide strong cast-iron gratings in cased frames to all gullies throughout the premises.

Provide guttering and down pipes, with brackets and holdfasts proper for same.

Provide wrought-iron chimney bars to all chimney openings, as specified.

Provide and properly fix not more than 3 inches apart, and with carved ends, with spreading shoes to screw to window frames, $\frac{3}{4}$-inch round wrought-iron safety bars to scullery, store-room, closet, water-closet, and porch external windows to basement.

Fix in top step under the front door, and all the width of the opening, an ornamental strong cast-iron water grate 4 inches wide, with strong frame, to prevent rain water driving into porch, and lay a drain from the space under the step to carry water into nearest gully.

The spouting to be submitted for inspection of surveyor before being used; all to be moulded and cast with mask heads with folding joints, joined with white lead, and fixed on strong iron brackets.

PAINTER.

Stop, knot, and paint four times in the best oil colours all the woodwork and external and internal ironwork usually painted.

Grain in imitation of oak all the external doors and window frames.

The last coat of paint for internal work to be executed in such colours as the surveyor shall direct.

The bars of the stairs to be painted four coats, and finished green.

PAPER HANGER.

The walls to be sized, lead papered, and prepared for papering. The bedrooms all to be papered, the front bedrooms with paper 3d. per yard, the back bedrooms with paper 1½d. per yard. All the papers to be submitted to surveyor for approval.

No papering to be done on the staircase walls, or on any walls of the ground floor.

BELLHANGER.

The house to have a bell to ring from the entrance gate and principal entrance door, one from each sitting-room on the principal floor, and one from each bed and dressing-room on the first floor. The wires to be best copper, concealed in zinc tubes where necessary. The whole of the rooms to have approved rose and lever pulls.

A bell board with bells to be fixed in the passage in the basement opposite the staircase. Each bell to have a vibrating pendulum.

Each bell to be of a different tone, and the whole of the work to be done in a complete and satisfactory manner.

The contract for this house was 1115*l.*

ESTIMATE.—Villa proposed to be erected on . at . from the Drawings and Specification of . Architect.—April, 1863.

Summary.

	£	s.	d.
1. Excavator and bricklayer . . .			
2. Mason and slater			
3. Carpenter			
4. Joiner and ironmongery . . .			
5. Smith and bellhanger			
6. Plasterer			
7. Plumber			
8. Glazier			
9. Painter and paper-hanger . . .			
£			

£ s. d.

The contractor is to state in his tender the difference of cost if iron cramps are used in the hollow walls, according to the common custom of the island, in lieu of Jennings's patent bonding bricks, as taken in quantities.

EXCAVATOR AND BRICKLAYER.

The concrete to be composed of four parts of screened gravel or stone, two parts coarse clean sand, and one part of fresh well burned ground stone lime, and to be thrown into trenches from a stage 10 feet high, whilst hot, and levelled at once.

The external walls to be carried up hollow, as described, with hard, well-burnt, and well-formed kiln bricks, and to present the appearance of Flemish bond, and the patent bonding bricks to be manufactured of a colour to correspond with the facing bricks, and the bricks to be wetted before being laid.

The mortar to be composed of one-third of well-burnt stone lime, and two-thirds clean, sharp, river or pit sand, and no more to be made at one time than is sufficient for the day's consumption.

The cement to be Roman of the best quality, and mixed in equal proportions with clean, sharp, river or pit sand, and to be made up in small quantities only as required for immediate use.

Yds.		
313	Cube.	Digging, carting and depositing on adjoining premises where directed . .
76	„	Digging, filling in, and ramming . .
20	„	Hard dry rubbish filled in and well rammed . . . . .
69	„	Concrete . . . . .
33	Sup.	Do. 6 inches thick . . . . .
Ft.		
206	Run.	Strutting to perpendicular trench for concrete 2 feet deep . . . .
38	„	Do. to perpendicular sides of hole for tank 12 feet deep . . . . .

Continued . . . £

Rods.	Ft.			£	s.	d.
			Continued			
15		Sup.	Reduced brickwork in mortar . .			
1	36	„	Do. do. do. in hollow walls built in two thicknesses of one brick each, with space of 2 inches between same (measured nett), but including Jennings's patent bonding bricks at every second course, and not more than 18 inches apart, the bonding bricks to be manufactured to match the facings . . .			
5	56	„	Do. in do. in two thicknesses, viz. the outer wall half brick, and the inner wall one brick do. do. do. . . .			
7	136	„	Do. in do. in two thicknesses of half brick each, do. do. do. . . .			
	148	„	Reduced brickwork in cement . . .			
	10	„	Half-brick bearers do.			
	41	„	Do. arches do.			
	47	„	Do. trimmers do. . . .			
	238	„	Rough cutting			
	149	„	Two courses of plain tiles in cement .			
	74		Gauged arches			
	5250	„	Extra to the best picked facings, and neat flat joint pointing			
Yds.						
21		„	Stop and twice limewhite			
140		„	Lime and hair pugging, inch thick . .			
21		„	Rendering in cement $\frac{3}{4}$-inch thick . .			
147		„	Brick flat nogging in mortar . . .			
$5\frac{1}{3}$		„	Brick on edge paving in cement . .			
	297	Run.	Rough cut one course			
	70	„	Rough birdsmouth cutting . . .			
	56	„	Cut and rubbed splay			
	152	„	Rake and point in cement to flashings .			
	10	„	Cutting and pinning slate shelf in cement			
	393	„	Extra to splayed footlace in moulded bricks			
			63 external mitres to do.			
			23 internal do. do.			
	58	„	Taylor's patent damp-proof course, and laying in 14 inches wall . . .			
	134	„	Do. do. 18 inches do.			
		21	Frames bedded and pointed . . .			
		18	Making good to window-sills . . .			
		11	Flues cored			
		24	Ends, steps, &c., cut and pinned in cement			
			Continued . . . £			

Ft.		£ s. d.
	Continued . . .	
1	Extra to forming manhole in half-brick arch, including brick curb to receive cover	
58 Run.	4-inch metallic earthenware socket drain pipes, bedded and jointed in clay, including digging, carting, filling in, and ramming complete	
160 „	6-inch do. do. do. . .	
	Extra to No. 10 4-inch bends . .	
	Do. No. 16 6-inch do. . . .	
	Do. No. 1 4-inch junctions . .	
	Do. No. 5 6-inch do. . . .	
218 „	6-inch metallic earthenware pipe drains with patent saddles, bedded and jointed in clay, including digging, carting, filling in and ramming complete . .	
	Extra to No. 10 bends	
	„ No. 4 junctions . . .	
3	6-inch syphon traps	
15 Run.	Opening and making good ground for pipe	
10	Ends pipe made good to drain, in cement	
4	„ „ tanks, &c., in cement	
1	End of drain made good to existing drain	
1	Half-brick cesspool in cement . .	
1	Half-brick cesspool 12 inches square and 3 feet 6 inches deep in clear, built and rendered inside in cement, including York stone bottom and cover and puddling, digging, carting, and filling in and ramming complete	
	Provide water for the use of the works .	
	Give all notices and pay all fees . .	
	Insurance	
	Clear and cart away all superfluous rubbish	
	Setting only, but including all necessary fire-bricks, &c.:	
8	Register stoves	
1	Stove with holes	
1	60-inch kitchen range	
1	20-gallon copper complete . . .	
	Cut away for and make good after all trades	
	Carried to summary . . £	

MASON AND SLATER.

All the stone to be the best of its respective kind, free from vents, sand-holes, and other defects. The York to be of the hardest quality from the underbeds.

Ft.		*Portland stone:*	£	s.	d.
78	Cube	Stone and setting			
4	„	Do. scantling and do.			
151	Sup.	Plain beds and joints			
218	„	Do. face			
6	„	Rough sunk work			
4	„	Sunk joints			
103	„	Sunk face			
22	„	Moulding			
2	„	Stopped moulding			
5	Run.	Back joint			
5	„	Rebate and back joint			
316	„	Throat			
	2	Mortises			
	116	Holes for balusters and running with lead.			
	8	Do. for standards and braces do. . .			
	2	Stopped ends to mouldings, 3½ inches girt			
	2	Do. do. 6 inches do. .			
	4	External mitres to moulding, 3½ inches do.			
	4	Do. do. 6 inches do. .			
	2	Do. do. 9 inches do. .			
	2	Internal mitres to moulding, 3½ inches do.			
	33	Birdsmouth joggles, 4 inches long, and cement			
	4	Do. 6 inches long, do.			
	24	Plugs and lead			
		Yorkshire stone:			
162	Sup.	Rough cores, &c.			
26	„	Tooled slabs and hearths			
104	„	Rubbed do. do.			
21	„	3-inch paving on bressummer . . .			
299	„	3-inch rubbed paving, jointed in cement .			
6	„	4-inch rough cover stone . . .			
12	„	6-inch tooled landing			
6	„	6-inch tooled sink			
8	„	Coped edges			
3	„	Rough sunk work			
18	Run.	Back joint			

Continued . . . £

Ft.			£ s. d.
		Continued . . .	
222	Run.	Coped edges to cores, &c. . . .	
16	„	Rough sunk edge	
4	„	Sunk notching	
35	„	Tooled sunk, weathered, and throated window sills, $8\frac{1}{2}'' \times 4''$	
7	„	Do. do. $13'' \times 4''$	
4	„	Tooled step $12'' \times 7''$, back jointed . .	
4	„	Do. do. rebated and back-jointed . .	
4	„	Do. $16'' \times 7''$, back jointed . . .	
4	„	Do. do. rebated and back jointed . .	
	4	Mortises	
	20	Notchings in slabs	
	27	Plain ends to window sills . . .	
	1	Rebated hole for trap in sink . .	
	1	Rounded corner to do.	
	11	Perforations $14'' \times 9''$, through 3-in. stone	
	2	Do. do. through 6-in. do. .	
	4	3-inch tooled templates $14'' \times 9''$ . .	
	8	Do. do. $9'' \times 9''$, with coking hole and lead to each . .	
	4	6-inch hinge stones $14'' \times 14''$, tooled fair on two sides, and including holes for claws of hinges and running with lead.	
	1	6-inch tooled sink $2' \times 1'\ 6''$, with rebated hole for grating	
	1	Rubbed York chimney-piece to 1ft. 8in. opening, with plain jambs, haunch-cut mantel, and wide shelf, with strong brackets under same, including cramps and fixing complete	
	1	Do. to 5 feet opening do. do. do.	
	2	Enamelled slate chimney-pieces of the P. C. value of 2*l.* each, exclusive of fixing, and including cramps and fixing complete	
	5	Do. 3*l.* 10s. each do. do. .	
	1	Do. 5*l.* do. do. . .	
		Cut away for and make good after all trades.	
Sqs.	Ft.		
26	40	Sup. Best Bangor countess slating, laid with a 3-inch lap, and nailed with two stout copper nails to each slate . . .	
11		„ $1\frac{1}{4}$-inch, planed one side, slate shelf . .	
6		Run. $1\frac{1}{4}$-inch rubbed edge	
		Leave all perfect at completion.	
		Carried to summary . £	

Carpenter.

All the timber, except where otherwise specified, to be the best, sound, and well-seasoned Baltic, Memel, or Riga, free from sap, shakes and large or dead knots.

The deals to be Christiania, and the oak of English growth.

Ft.			£	s.	d.
112	Cube	Fir in plates, lintels, &c.			
925	„	Do. framed			
115	„	Do. ground joists			
34	„	Oak sleepers			
Sqs.					
25 40	Sup.	$\frac{3}{4}$-inch rough deal boarding for slates			
12 60	„	Do. sound boarding and fillets			
21	„	Inch deal boarding edges, shot and firrings			
109	„	Do. gutter boards and bearers			
8	„	Do. do. and framed bearers			
43	„	$1\frac{1}{4}$ deal tongued trough gutter and framed bearers			
120	„	2-inch deal framed			
247	„	Deal-framed cradling $2\frac{1}{2}'' \times 2''$			
11	Run.	Rebated drip			
2	„	Rounded roll			
472	„	Tilting fillet			
24	„	Feather edge springing pieces			
85	„	Rough fillet $3'' \times 2''$, spiked to wall			
72	„	Herring-bone strutting			
186	„	$2\frac{1}{2}$-inch hip, and ridge-rolls and irons			
20		Framed bridging pieces			
2		Cesspools in gutter			
3		Rebated drips			
76	Sup.	Centering to arches			
47	„	Do. to trimmers			
2		Rough turning pieces to 1 foot 8 inches opening, and $\frac{1}{2}$ brick sofite			
3		Do. 4 feet do. do.			
1		Do. 4 feet 6 inches do. do.			
1		Do. 5 feet 10 inches do. do.			
3		Turning pieces to gauged arches 1 foot 8 inches, opening half brick sofite			
1		Do. 1 foot 10 inches do. do.			
1		Do. 2 feet 6 inches do. do.			

Continued . . . £

Sup.		£ s. d.
	Continued . . .	
1	Turning piece to gauged arch, 2 feet 10 inches opening, half brick sofite .	
1	Do. 3 feet 9 inches do. do. .	
5	Do. 4 feet do. do. .	
2	Turning pieces to gauged arches 3 feet opening, 1 brick sofite	
	Provide all hoarding that may be required for the works.	
	Cut away for and make good after all trades.	
	Carried to summary . £	

JOINER AND IRONMONGERY.

The framings, floor boards, skirtings, and door linings are to be of Norway deals and battens; elsewhere the joinery may be of white deals and battens, excepting the window-sills, which are to be of the best English oak.

The floor boards and framings are to be prepared immediately on signing the contract, but the framings are not to be wedged up until required for use; to be kept in some dry, warm place, and care taken that at no subsequent period they shall be exposed to rain or moisture.

The mahogany to be of the best bright quality.

Sqrs.	Ft.			£ s. d.
	8	Cube	Fir proper door cases	
3		Sup.	Inch deal wrought folding floor, including glued and mitred borders to the slabs .	
22	50	„	$1\frac{1}{4}$-inch deal wrought straight joint floor edge nailed, and with glued and mitred borders to the slabs	
	7	Run.	$\frac{3}{4}$-inch deal square skirting, 4 inches high	
			2 dovetailed angles	
			2 quadrant corners	
	147	„	Inch deal beaded skirting, 8 inches high, including grounds, fillets, and backings	
			14 housings	
			26 tongued and mitred angles . . .	
			Continued . . . £	

Ft.			£	s.	d.
		Continued . . .			
52	Run.	Inch deal moulded skirting, 8 inches high, including grounds, fillets, and backings			
288	„	Do., 10 inches high, do.			
		30 housings			
		52 tongued and mitred angles . . .			
		1 Returned end			
		$1\frac{1}{4}$-inch deal sunk plinth, 10 inches high, and moulding 4 inches girt, including grounds, fillets, and backings . .			
		24 housings			
		26 tongued and mitred angles . .			
53	„	$1\frac{1}{4}$-inch deal sunk plinth, 13 inches high, and moulding 5 inches girt, including grounds, fillets, and backings . .			
		8 housings			
		14 tongued and mitred angles . . .			
9	Sup.	$1\frac{3}{4}$-inch deal moulded fixed sashes . .			
7	„	2-inch deal do. do. . . .			
71	„	Deal cased frames, oak sunk sills, and $1\frac{3}{4}$-inch deal moulded sashes, single hung with brass axle, pulleys, patent lines, and iron weights . . .			
307	„	Do., do., but double hung with do. do. .			
69	„	Deal cased frames, oak sunk sills, and $1\frac{3}{4}$-inch deal moulded sashes, double hung with brass axle, pulleys, patent lines, and lead weights . . .			
52	„	Deal cased Venetian frame, oak sunk sill, and $1\frac{3}{4}$-inch deal moulded sashes, with centre part double hung with do. .			
17	„	Inch deal proper ledged door . . .			
4	„	$1\frac{1}{4}$-inch deal one panel, moulded, and square trap-door			
54	„	$1\frac{1}{2}$-inch deal four panel, moulded, and square doors			
107	„	Do. four panel, moulded both sides door .			
20	„	$1\frac{3}{4}$-inch deal four panel, moulded, and bead flush doors			
58	„	2-inch deal six panel, moulded both sides door			
58	„	Do. six panel, moulded, and bolection moulded doors			
35	„	2-inch deal two panel, moulded, and bolection moulded folding doors . . .			
		Continued . . . £			

Ft.			£	s.	d.
		Continued . . .			
54	Sup.	2-inch deal framed and beaded folding gates, filled in with $1\frac{1}{4}$-inch matched and beaded batten boarding . .			
	1	Extra to cast-iron grating $1' 3'' \times 2' 6''$, in do.			
61	Sup.	$1\frac{1}{4}$-inch deal moulded window backs .			
42	„	Do. framed and beaded dwarf closet front, and one panel moulded, and square folding doors			
100	„	Do. framed and beaded cupboard fronts, and moulded and square folding doors in two heights, the lower doors in one panel, and the upper doors in two panels each			
5	„	$\frac{3}{4}$-inch deal, wrought one side, and staff-beaded linings and backings . .			
32	„	Inch deal, wrought one side, and staff-beaded sofite fixed with screws . .			
166	„	Do. wrought one side, tongued, and cross-tongued, do. do.			
93	„	Do. wrought one side, grooved, and bevilled facia fixed with screws			
130	„	Do. wrought one side, tongued, and splayed linings and backings			
37	„	Do. wrought one side, tongued, cross-tongued, and splayed do. and do. .			
27	„	Do. wrought one side, tongued, staff-beaded, and splayed, do. and do. . .			
290	„	Do. wrought, framed, and grooved grounds			
11	„	Do. water-closet seat, riser, and bearers .			
6	„	Do. beaded frame, and mitre clamped flap			
144	„	Do. wrought both sides, and cross-tongued			
14	„	$1\frac{1}{4}$-inch deal, wrought one side, tongued, and rounded window-board and bearers			
37	„	Do. wrought one side, tongued, and moulded, do. and do.			
19	„	Do. wrought one side, tongued, cross-tongued and moulded do. and do. .			
14	„	Do. sunk, grooved, and return beaded apron linings and backings . .			
	1	Piece of do. 11 inches wide to quadrant corner 10 inches radius . . .			
		Continued . . .	£		

			£	s.	d.
		Continued . . .			
	1	Piece of $1\frac{1}{4}$-inch deal to semicircular well-hole 1 foot 8 inches diameter . .			
11	Sup.	$1\frac{1}{4}$-inch deal double staff-beaded bell-board, fixed with screws . . .			
		2 staff-beaded and mitred ends, to do. .			
99	„	$1\frac{1}{2}$-inch deal double rebated and double beaded jamb linings			
17	„	Do. double rebated jamb linings and backings			
22	„	Do. double rebated and cross-tongued, do. and do.			
3	„	Deal moulding			
48	Run.	Labour to bead			
143	„	Do. groove			
31	„	Do. do. in oak			
3	„	Do. rounded nosing to inch deal . .			
4	„	Do. rebate $2\frac{1}{4}$ inches girt . . .			
5	„	Do. do. $2\frac{1}{2}$ do.			
50	„	Deal square rebated angle staff . .			
177	„	Rebated and beaded do.			
17	„	Beaded, chamfered, and mitred stop .			
16	„	$1\frac{1}{4}$-inch deal moulded nosing . . .			
		1 piece of do. to quadrant corner 10 inches radius			
		1 piece of do. to semicircular well 1 foot 8 inches diameter			
70	„	Inch deal narrow grooved grounds . .			
187	„	Deal moulding 2 inches girt out of $1\frac{1}{4}'' \times 1\frac{1}{2}''$			
372	„	Architrave moulding 3 inches girt . .			
9	„	Deal double moulded and grooved capping out of $4'' \times 3''$			
		2 bevilled joints			
528	„	Deal beaded and moulded architraves 5 inches wide			
40	„	Pipe casings with $1\frac{1}{4}$-inch deal rebated and beaded grounds, and $\frac{3}{4}$-inch deal clamped panels fixed with screws .			
	36	Notchings			
	6	Quadrant corners to inch deal . .			
	10	Returned ends to rounded window-boards			
	26	Do. to moulded do.			
	8	Tongued angles to facia 6 inches wide .			
	9	Shiplapped joints 12 inches long . .			
		Continued . . . £			

Ft.		£ s. d.
	Continued . . .	
8	Mitres to moulding 2 inches girt . .	
1	Dished hole in seat	
1	Beaded do., for pull	
72	Dovetailed backings to 6-inch jambs . .	
9	Wrought and chamfered shelf bearers 12 inches long, plugged to wall . . .	
12	Do. do. 13 inches long, do. . .	
16	Do. do. 17 inches long, do. . . .	
12	Wrought, double chamfered and tapered bearers, 16 inches long 3″×2″ with quadrant and double chamfered end .	
1	Proper ledged copper-lid, with cut handle	
1	Plate rack 3 feet long, three tiers in height, with inch deal rim and fixing complete	
1	Dresser 8 feet 9 inches long, with 1½-inch deal clamped top, inch pot-board on proper bearers, proper framed legs and rails, three drawers with brass drop handles, four tiers of inch sunk plate shelves, 1¼-inch cut standards, ¾-inch matched and beaded back lining, and ¾-inch facia, with moulding at top and fixing complete	
2	Oak wrought gate stops, rounded at top, with socket let in for bolt, and digging, filling in, and ramming	
111 Sup.	1½-inch deal moulded treads, inch deal risers with returned ends, strong fir carriages, and glued, blocked, and bracketed	
230 Run.	Inch deal square bar dovetailed or framed balusters	
20 „	1½-inch deal moulded wall strings . .	
	2 extra to ramps	
19 „	1½-inch deal, sunk, returned, beaded, grooved, cut, and mitred outer string .	
20	Housings to moulded steps and risers .	
18	Return moulded nosings	
18	Deal fancy cut brackets to ends of steps .	
1	Curtail end to moulded step and riser .	
	Continued . . .	

Ft.			£ s. d.
		Continued . . .	
		Best bright Honduras mahogany and French polishing :	
14	Sup.	Inch seat, and panelled and moulded riser and deal bearers	
8	„	Do. beaded frame and mitre-clamped flap	
18	„	Do. wrought both sides, tops fixed with, and including buttons and screws and deal bearers	
14	Run.	Labour to moulded edge on inch . .	
4	„	Tongued and moulded nosing . . .	
21	„	$\frac{3}{4}$-inch skirting, 3 inches wide . .	
		6 dovetailed angles	
		6 quadrant corners	
8	„	$\frac{3}{4}$-inch square skirting, 4 inches high . .	
		2 dovetailed angles	
		2 quadrant corners	
6	„	$\frac{3}{4}$-inch double moulded rail, 4 inches wide, plugged to wall	
		2 returned ends	
	3	Long notchings in inch	
	3	Quadrant moulded corners to do. . .	
	1	Dished hole in seat	
	1	Beaded do. for pull	
	1	Seat and riser, made movable . .	
35	Run.	Spanish mahogany moulded handrail $2\frac{3}{4}'' \times 2\frac{1}{4}''$, including joints and screws and French polishing	
1 ft. 6 in.	„	Level circular do. do. . .	
3	„	Writhed do. do. . .	
3	„	Scrolled do. do. . .	
		Ironmongery of the best description, including screws and fixing :	
	15	Pairs $2\frac{1}{2}$-inch wrought butts . . .	
	9	Do. $3\frac{1}{2}$-inch do. . . .	
	6	Do. 4-inch do.	
	6	Do. 5-inch do.	
	2	Do. 3-inch brass butts	
	1	Do. 18-inch cross-garnet hinge . .	
	2	Do. 30-inch Collinges' gate hinges . .	
	15	6-inch spring plate neck bolts . .	
	1	6-inch barrel bolt	
	4	10-inch do.	
	4	12-inch do.	
	2	30-inch do.	
		Continued . . .	

		£	s.	d.
	Continued . . .			
7	4-inch cupboard locks			
3	7-inch iron rim locks with brass furniture			
12	6-inch mortise locks, with rosewood furniture			
1	8-inch copper warded mortise lock with bronze furniture			
2	10-inch drawback locks with rosewood furniture			
2	Norfolk latches			
7	Brass knobs and roses			
32	Do. sash lifts			
18	Do. spring sash fastenings . . .			
6	Do. double hat and coat hooks . .			
1	12-inch brass barrel door chain . . .			
2	Iron knockers of approved pattern . .			
4	Do. dowels			
	Carried to summary . £			

SMITH AND BELL-HANGER.

Ft.				
		Cast iron :		
192	Run.	3-inch rain-water pipe, including nails and fixing complete		
		7 heads		
		2 double bends 1 foot 6 inches girt .		
		4 do. 2 feet girt . . .		
15	„	5-inch soil pipe, including leaded joints, tacks, and fixing complete . . .		
187	„	5-inch strong moulded eaves gutter, including plain clips, and jointed with white lead, and securely fixing to feet of rafters complete		
		6 extra to external elbows . . .		
		2 do. to internal do.		
		6 outlets		
62	„	Railing to front fence, with wrought-iron top $2\frac{1}{4}'' \times 1\frac{1}{2}''$, $\frac{7}{8}$-inch cast-iron round bars 2 feet 9 inches high from coping, and 6 inches from centre to centre, with ornamental heads, as approved by the surveyor, and fixing complete		
		4 extra to $1\frac{1}{4}$-inch standards, with back stays complete		
		Continued . . .		

		£ s. d.
	Continued . . .	
38	Cast-iron air bricks and fixing provided .	
2	Strong tray boot scrapers and fixing .	
1	6-inch grating	
1	Register stove P. C. 25s. . . .	
6	Do. P. C. 35s. each	
1	Bright register stove P. C. 6*l.* . .	
1	20 strong stove, with hobs and wrought-iron bars	
1	60-inch kitchen-range, with self-acting boiler, &c., P. C. 7*l.* 10s. . . .	
1	Supply cistern and cover, including short wrought-iron connecting pipe to boiler and brass unions, and fixing complete .	
1	20-gallon strong copper . . .	
1	Furnace door and frame	
1	Set furnace and bearing bars . . .	
1	Soot door and frame	
1	Damper	
Cwt. qrs. lbs.	*Wrought iron:*	
2 0 7	Chimney and cradle bars, and fixing . .	
2 1 4	Screw bolts and strap ties, and fixing .	
16	Stout staples and driving	
32	Dognails and do.	
40	¾-inch screw bolts, 6 inches long, with heads, nuts, and washers, and fixing .	
3	Balusters 1″×1″, and 2 feet 9 inches long, with flapped ends and fixing . .	
3	Do. 3 feet long, and do.	
1	Strong wrought-iron cistern to contain 50 gallons, including fixing complete .	
	The whole of the bells to be of a different tone, and to be turned and hung in the best manner, with concealed metal tubes, stout copper wire, strong brass cranks, labels, and pendulums complete.	
5	Bells in passage, ground floor, with one rosewood lever pull to each in rooms on one pair	
3	do. do. with two rosewood lever pulls to each in rooms on ground story	
1	do. do. with ornamental bronze sunk pull at entrance gate .	
1	do. do. do. do. at entrance door	
	Carried to summary . £	

PLASTERER.

All the laths to be stout and of full thickness, and the whole of the materials and workmanship of the best quality.

Roman cement—jointed and coloured:

Yds.	Ft.			£	s.	d.
	211	Sup.	Narrow face			
	54	„	Do. and dubbing inch thick			
	130	„	Weathering			
	395	„	Moulding			
	122	Run.	Arris			
	382	„	Narrow return and arris			
	44	„	Narrow margin and arris			
	60	„	Return 2 inches wide and arris			
	179	„	Moulding $3\frac{1}{4}$ inches girt			
		26	Stopped ends to moulding 14 inches, girt average			
		140	Mitres to moulding 10 inches, girt average			
		76	Brackets 3 inches wide on face, 7 inches high, and 4 inches projection, with moulded fronts and plain sides and modelling			
		41	Brackets 4 inches wide on face, 1 foot 2 inches high, and 11 inches projection, with moulded fronts, having two semi-circular channels in same, and square sunk panel at top, plain sides, and including moulded caps 3 inches girt, mitred round same, and to bed moulding and modelling			
		4	Consoles 6 inches wide on face, 1 ft. 6 in. high, and 6 inches projection, with moulded fronts, ornamental sides and moulded cap, mitred round same, and to bed moulding and modelling			
		2	Consoles 6 inches wide on face, 2 ft. 4 in. high, and 6 inches projection, with moulded and enriched faces, ornamental scroll sides, leaf at foot, and moulded and mitred caps mitred round same, and to bed moulding and modelling			
178		Sup.	Twice colour in distemper			
280		„	Clearcole and whiten ceilings			
	666	„	Do. do. cornices			
178		„	Render and set			
411		„	Render, float, and set			

Continued . . .

Yds.	Ft.			£	s.	d.
			Continued . . .			
42		Sup.	Lath, plaster, and float			
59		,,	Lath, plaster, and set ceilings . . .			
215		,,	Lath, plaster, float, and set sides . .			
221		,,	Do. do. ceilings . .			
	96	Run.	Quirk			
	4	,,	Circular quirk			
	10		Making good to chimney-pieces . .			
	666	Sup.	Plaster moulded cornices			
	96		Mitres to do. 12 inches girt average .			
			Cut away for and make good after all trades.			
			Carried to summary . £			

PLUMBER.

The lead to be the best Newcastle milled lead.

Cwt.	Qrs.			£	s.	d.
46	1		Milled lead and labour in roofs . .			
	3		Do. do. in safe, &c . .			
		Ft.				
	41	Run.	Close copper nailing			
	2	,,	Soldering			
	46	,,	½-inch strong lead pipe, including joints, wall-hooks, and fixing complete . .			
	88	,,	¾-inch do. do. do. . .			
	110	,,	Inch do. do. do. . . .			
	14	,,	1¼-inch do. do. do. . .			
	4	,,	2-inch do. do. do. . . .			
	45	,,	Inch do. do. do. including opening and making good ground			
	28	,,	3-inch lead pipe, including joints and fixing complete			
		1	Rose end to do.			
		102	Lead bale tacks			
		2	Extra labour and solder to cesspools .			
		1	Lead dribble and soldering . . .			
		1	1½-inch lead trap, and soldering both ends			
		1	Lead trumpet-mouthed waste-pipe, 1 foot 9 inches long, $2\frac{1}{4}'' \times 1\frac{1}{4}''$ and soldering .			
		1	3-inch double bent lead socket pipe, 2 feet girt, and soldering			
		1	3-inch double bent lead socket pipe, 2 feet girt, one end soldered to cesspool, the other end made good to cast-iron down pipe			
			Continued . . . £			

Run.		£ s. d.
	Continued . . .	
1	5-inch double bent pipe 3 feet 6 inches girt out of 7 lbs. lead, one end made good to iron soil pipe, the other end made good to water-closet trap . .	
1	2-inch brass grate and soldering . .	
1	4-inch brass bell grate and lead trap, and cementing	
2	¾-inch brass bib cocks, with screw bottoms and bosses and joints . . .	
1	½-inch brass ball-cock with screw bottom and boss copper ball and joint . .	
1	Inch brass roundway do. do. do. .	
1	¾-inch Jennings's patent self-closing stool cock, with brass sunk handle and joints complete	
1	¾-inch brass washer and union to iron, including hole in iron cistern, and cementing and soldering . . .	
1	Inch do. do. do. . .	
1	1¼-inch brass washer and waste, with union to iron, including hole in iron cistern, and cementing and soldering .	
1	Connection to company's main, including paying fees	
1	4-inch iron pump, with brass valves and fixing complete	
1	White glazed ware hopper and trap, including brick seating and making good to drain	
1	Jennings's patent water-closet apparatus and trap, with regulator, blue basin, opal glass handle, and fixing complete.	
	Carried to summary . . £	

GLAZIER.

All the glass to be puttied and back puttied and sprigged where necessary.

Ft.				£ s. d.
23	Sup.	Best 26-oz. sheet glass, and glazing under 3 feet sup. in each square . . .		
9	„	Do.	do. 5 feet do. . . .	
11	„	Do.	do. 6 feet do. . .	
23	„	Do.	do. 8 feet do. . . .	
55	„	Do.	do. 10 feet do. . .	
23	„	Do.	do. 12 feet do. . . .	
			Continued . . £	

			£ s. d.
122	Sup.	Best 26-oz. sheet glass, and glazing under 14 feet sup. in each square . . .	
13	„	Best British polished plate glass, and glazing under 4 ft. sup. in each square	
19	„	Do. do. 5 feet do. . . .	
6	„	Do. do. 6 feet do. . .	
21	„	Do. do. 12 feet do. . . .	
25	„	Do. do. 14 feet do. . .	
		Leave all perfect at completion.	
		Carried to summary . . £	

PAINTER AND PAPERHANGER.

All the work to be previously knotted and stopped.

Yds.	Ft.		£ s. d.
442		Sup. Four times in oil, approved tints . .	
	696	Run. Skirting and strings	
	53	„ Do. 18 inches girt	
	72	„ Margins	
	40	„ Pipe casings	
	177	„ Angle staff	
	247	„ Balusters	
	187	„ Eaves gutter	
	192	„ Rain pipe	
		7 heads	
		38 Air bricks	
		2 Scrapers	
		1 Pump	
		9 Dozen large squares . . .	
		18 Frames	
		2 Two light frames	
		1 Venetian frame	
23		Sup. Extra to graining in imitation of wainscoat, and twice varnishing . .	
		4½ Dozen large squares	
		18 Frames	
		2 Two-light frames	
		1 Venetian frame	
		9 Pieces of paper at 1s. 6d. per piece, P. C., and hanging same cut close .	
		40 Pieces of paper at 3s. per piece, P. C., do. do. do. . . .	
		Preparing and sizing walls for No. 49 pieces of paper	
		Clean all glass, and clean and scour down all floors, pavings, &c., at completion .	
		Carried to summary . £	

Schedule of Prices.

	£	s.	d.
Excavation and levelling, per yard cube	0	0	9
Concrete	0	4	0
Reduced brickwork, per rod	12	10	0
Bricknogging, per yard	0	2	6
Stock brick paving flat, per yard	0	2	3
Gauged arches, per foot	0	2	0
Brick trimmers in cement, per yard	0	2	9
6-inch glazed pipes and digging, per foot	0	0	8
4 „ „ „ „ „	0	0	6
Bedding window-frames, each	0	1	0
Slating, per square (Countess)	1	10	0
Slating battens, per square, 4s. 6d.	0	10	0
1¼ slate tank, per foot	0	3	6
Fir timber in framework, per foot cube	0	2	6
Oak „ „ „ „	0	3	6
Door cases, per foot cube	0	4	0
1½ dovetailed cisterns, per foot	0	1	6
Fencing, per perch	0	4	6
⅞ white floors, laid, per square	1	4	0
1-inch „ „ „	1	6	0
Sashes and frames, per foot	0	1	0
2-inch four-panelled doors, double moulded, per foot	0	1	1
1¼ „ square framed shutters	0	0	9
1¼ „ closet fronts and doors	0	0	9
Render, float, and set, per yard	0	1	4
Lath, float and set, &c., white, per yard	0	1	4
12-inch cornice, including mitres, per foot	0	1	0
2½ York paving square, &c., laid, per 100 feet	5	0	0
Portland moulded steps, per foot	0	3	6
Box mantels, each	1	0	0
Marble mantels, each	3	0	0
2½ York landings, per foot	0	1	9
Stone brackets, each	0	2	6
York window-sills, per foot	0	1	9

Ironmongery.

Balcony railings, per foot	0	3	0
Handrails	0	1	9
Ranges, each, from	2	10	0
Eaves gutters, from	0	0	8
Air-bricks, each	0	0	6

Painter.

4 oils flatted, per yard	0	0	9
„ grained „	0	1	9

	£	s.	d.
4 oils, green, per yard	0	1	4
Tar, per yard	0	0	4

Plumber.

Lead laid, per cwt.	1	10	0
Zinc, per foot	0	0	5
1-inch supply pipe, per foot	0	0	9
$1\frac{1}{2}$ „ waste pipe, and joints, per foot	0	1	3
$\frac{3}{4}$ „ service	0	0	8
Pump, complete force	5	10	0
Pan and closet apparatus complete	5	0	0

Glazing.

Flattened plate, per foot	0	1	0
Ground glass, per foot	0	1	1
Newcastle crown, per foot, fixed	0	0	8

VI.—*Particulars of the several Works and Materials required in the erection of a* Poor House *for the Union, to accommodate sixty Paupers, according to Plans, Elevations, and Sections provided herewith. The Building is to be erected on the Site marked out immediately adjoining the , on the .*

EXCAVATOR, BRICKLAYER, AND MASON.

The whole of the materials, of whatever description, and which must be of the best quality, to be provided by the contractor.

The areas to be levelled, so that the floors of the several buildings shall each stand 1 foot above the level of the courts, and the courts are to be formed with a regular and proper fall on all directions to the traps in each court.

The foundations of the whole of the walling to be

sunk to the depth of 2 feet 6 inches below the present surface of the ground, and after the walls are carried up the ground afterwards to be filled in to the heights shown on the sections of the site. The stuff for filling in, and also for the levelling and finishing off the courts, to be had from ; the contractor, however, paying all other attendant expenses, and the sand, and other building materials, if any will be required therefrom, at the usual prices at which they are charged to other parties.

In all cases a firm and solid foundation for all the walls must be obtained, and if, in carrying out the work, it be ascertained that the depth specified in the last paragraph be not sufficient to ensure a good foundation, the contractor must sink lower, and a fair compensation according to the architect's valuation shall be allowed to him for such extra work; but if it be not required to go so low as there specified, a deduction accordingly must be made from the amount of the contract money.

The ground must be filled up to the level shown on Sections for a space of 12 feet round the whole extent of the works.

To bale out or pump out and remove all soil and water which may be necessary for laying the foundations, drains, &c., whether arising from springs, drains, dippools, or rain, or otherwise, and to be answerable for all accidental damage that may accrue whilst the foundations and walls are carrying up.

The rubbish, as well as all superfluous earth that may come out of the foundations (if not wanted for raising any part or parts of the ground, or for other purposes), must be carted to a distance not exceeding fifty yards from the premises, as may be directed, as well as all rubbish that may accumulate in executing the works, and all that may be wanted to be retained

for purposes as above must be carted to such part or parts of the premises as the architect may direct.

Should the foundations, upon examination, prove to be insufficient, a slate flag, or flat-bedded stone not less than 3 inches thick, must be laid under such portion, and 6 inches wider than the walls they are to carry, and in no instance in shorter lengths than 3 feet.

All the walls (the respective thicknesses of which are figured on plans) throughout the whole of the buildings, as well as all the boundary walls, to be built of stone from the quarry, or such other stone as shall be approved by the architect, which must be well hammer faced on the external side, and fair faced on the internal side to receive plaster or white-wash, as the case may be; to be set true and close in mortar without pinners, and the joints struck clean and cemented outside, and to be levelled true at the heights of the floors and ceilings. The walls in the foundations of all the buildings (that is, up to the proposed level of the courts) must be 2 feet 6 inches thick, and to be well grouted with liquid mortar every 18 inches; immediately above the ground line an inch course of slate and cement to be worked the whole thickness of the walls throughout the building. The mortar to be compounded of stone, lime, and sharp, clean sand, to be ground in a pugmill, or otherwise well tempered and beaten together with wooden beaters, and to be mixed in the proportion of $\frac{1}{3}$ of lime to $\frac{2}{3}$ of sand.

The boundary walls to have rubble coping of the same stone as the walls themselves, and projecting 2 inches on either side of the surface thereof, and to be finished in the manner shown in the elevations and sections.

The quoins and story course to the front centre building, as well as the quoins and stonework to the front

entrance doorway and all corbels, to be of stone, or stone of the same colour and of equal quality, to be approved by the architect, to be neatly tooled and worked in regular courses with proper projections, and to be finished in every respect according to the architect's instructions.

The letters and figure over the entrance doorway in front to be cut in stone.

The copings of the several gables to be of or slate flag, the widths shown on elevation and sections. The chimney stacks to be worked according to the drawings.

All window sills for the several windows to be of slate flag from or , as the architect shall determine, 3 inches thick, and to project 3 inches beyond the external face of the walls, with a throating cut underneath.

The baths in the receiving wards, the eight washing trays shown on the plans, the sinks in washhouse and scullery, the fronts of all the privy seats (except where otherwise specified), and the urinals to be of slate flags, securely united and properly fixed on fire-brick piers where required; the flags to be procured from the or quarries, as shall be directed by the architect.

Flag steps to be provided and fixed to all doors, as shown on plan; the floors of the men's, boys', women's and girls' day-room, and also the floor of the school-room, to be laid with tiles, 10 inches square, in sand and mortar, and properly jointed so as not to admit water. The floors of the dining hall, men's and women's work-rooms, laundry, washhouse, kitchen, scullery, and store-room adjoining the floors of the two receiving wards, refractory cell, and dead-house, and of all ground floor passages throughout the

building (excepting the passage leading from the sick wards to the privies belonging thereto), and the floor of all privies (excepting those in the infirmary), and also the floors of the coal places and dust holes, are to be all of slate rag from the quarry, to be well and truly laid in sand and mortar, and jointed in a workmanlike manner; the whole to be laid on a bed of 6 inches of broken stone.

The floor of the entrance hall and passages adjoining to be properly laid with slate flags from the quarry.

The piers to the several gateways into the courts are to be built of large stone, neatly hammer faced in courses, and iron hooks inserted and leaded securely for the purpose of hanging the gates or doors, to be finished as shown on Section . The height of all boundary and division walls to be 8 feet.

The window and door lintels, or heads shown on the front elevation, to be of limestone, the thickness of 6 inches, and size marked on elevation. In other cases, fire-brick flat arches to be turned.

The reveals to the door and window openings in the front elevation to be worked with white fire bricks, as shown, to imitate stone quoins, in regular courses, and putty jointed. The reveals of all other door and window openings throughout to be worked in ordinary good fire.

All the flues throughout the whole of the buildings to be well and properly pargeted and cored, and the stacks truly built with native stone, hammer faced, and the cappings and bases worked according to the drawings.

Hearths and back hearths of slate flags from quarry to be provided and fixed to all fire-places throughout the whole of the buildings, and

under those on the upper story trimmer arches must be turned.

Boilers and grates to be provided, as shown on plan, for washhouse and scullery, and to be properly fixed in fire bricks, and an escape for steam to be built, independent of the flues over each boiler.

To provide good and sound and sufficient scaffolding, which is to remain for the use of the mason, carpenter, and all other artificers that may have occasion to use the same.

To build all the walls level, except where otherwise directed, to be answerable for all damage that may arise to the work from settlement or otherwise during the time of building, and to make good the same as the architect may direct, and further to perform all such jobbing work as shall be necessary for completely finishing the several buildings.

Stone cisterns to be provided and fixed, one where shown in the convalescent men's court, and two over the landing in the front centre building, to be fixed on good and sufficient supports, and rendered with white lead joints. The foundations for the cisterns in the convalescent men's court must be sunk to the same depth as the walls of the building, carried up to the level of the courts in stonework, and afterwards in fire brick, to carry the cistern bricks as shown in sections, and cement jointed same as the rubble work.

The two windows in the boys' day-room, and the two also in the girls', as also the two in each of their dormitories, which all respectively overlook the mens' and womens' courts, are to be worked as shown on the sections through these rooms, so that the bottom of the splay beneath each window shall be 5 feet from the level of the floor. The windows are to be framed as the other windows, and to be fitted with rough plate glass,

and a hopper in each, for ventilation purposes. This is to prevent the girls and boys from seeing into the mens' and womens' courts.

The whole of the courts are to be properly levelled after the buildings are completed, and the whole must be covered 4 inches thick with clean gravel. In each court there must be provided and fixed one stench trap, with proper communication with the drainage, so as to carry off the whole of the surface water. In all urinals there must be a drain head, to communicate with the sewers, and all cesspools must be laid so that no lodgment of soil will remain.

Walls must be built in the waiting-room, relieving-officer's room, master's parlour, and office or store-room. The lying-in ward, nurses' and surgeon's rooms, in two sick wards, all of which have boarded floors, for supporting the flooring joists.

A stone cistern is also to be provided and fixed where shown, near the with which it is to be connected. From the cistern a pipe is to be laid, communicating with the tank, to be constructed in the men's court, over which a force pump is to be fixed, to force the water into the above three cisterns, from which the whole of the building is supplied. The tank in the mens' court is to be 8 feet square, constructed of fire bricks set in cement, and cemented inside with Portland cement, the bottom to be of slate flag, and to have also a slate flag covering, properly supported.

The contractor will have to include the whole of this in his estimate.

DRAINAGE.

The drainage, which is to be carried out as shown in blue lines on the ground plan, must be executed with the very best glazed earthenware drain pipes, which

must be truly laid, with a sufficient and regular fall the whole of their way, and the joists must be well and properly cemented, proper bends, arms, single and double joints being provided for the junctions of two or more drains wherever required, 6 inches in diameter, and in 2 feet lengths.

The pipes from all water-closets, privies, washing trays, sinks, traps, urinals, &c., throughout the building to be of 6 inches diameter, and from the junction marked × to the tank pipes of 9 inches diameter, and to be used with proper junctions and joints properly cemented.

The tank which is intended to retain the sewage for agricultural purposes is to be formed at a distance not exceeding 10 yards off the junction of the drains at ×, a sum of 15*l.* to be included in the estimate, to be allowed to the contractor for the construction of the tank, according to the architect's directions.

He must likewise include in his estimate all other expenses for materials and labour of every description whatever, and all necessary excavating, and for properly laying down the drainage in every respect according to these and the future instructions of the architect, and in every respect to his entire satisfaction.

It will of course be advisable to lay down the drainage pipes before filling in the ground, as previously specified.

CARPENTER AND JOINER.

All the materials and labour of every description necessary for the thorough completion of the building according to the drawings and this specification are to be provided by the contractor.

All the joists, rafters, purlins, ridge boards, and principals, as well as all external door and window frames

throughout the building, to be of sound Baltic timber, all others to be of American pine oak, required to be used only where specified. The timbers and deals are to be well seasoned, cut square, and entirely free from sap wood, shakes, large knots, and all other defects.

If any part or parts of the carpenters' or joiners' work should shrink or fly within twelve months from the finishing and fixing the same, the contractor is to take down, refix, and make good the same, together with all works that may be affected thereby, at his own cost and expense.

No joints or rafters are in any case to be more than 12 inches in the clear apart from each other. The floors of the waiting-room, relieving-officer's room, master's parlour, and office opposite, of the lying-in ward, nurses' and surgeon's rooms, and of the mens' and womens' sick wards, to be laid with well-seasoned boards, 6 inches wide, cut full inch thick after the saw, well bradded upon joists $4\frac{1}{2} \times 3$, laid upon sleepers, supported by sleeper walls, and well bridged.

The floors of the four dormitories, as also of the board-room and office adjoining, and of the master's bedroom and store-room opposite, to be laid with well-seasoned boards, cut full inch thick after the saw, and not more than 6 inches wide, to be well bradded and worked off. The whole of the floors to be laid folding. In the board-room and office adjoining, and also in the master's parlour and bedroom, and waiting and relieving-officer's rooms, and also in the wards in the infirmary, must be provided and fixed single moulded 6-inch skirtings. Angle beads must also be provided and fixed wherever required and ordered. In the board-room and office adjoining, and also in the master's parlour and bedroom, must be provided and fixed casings to doors and windows.

The roof of the dining-hall to be framed upon principals, purlins 7×4, the several other buildings to be roofed on purlins 8×4; ceiling joists $4 \times 2\frac{1}{2}$ to be used in the two sick wards, lying-in ward, nurses' and surgeon's rooms, fixed across the purlins, as likewise in the four dormitories.

Ceiling joists to be fixed on wall plates across board-room and office, master's bedroom and store-room to be $4 \times 2\frac{1}{2}$.

Joists to the board-room and office, master's bedroom and store-room $8 \times 2\frac{1}{2}$ inches, and those of the dormitories to be $9 \times 2\frac{1}{2}$ inches; the whole of these and the ceiling joists to be well bridged. All rafters throughout the whole of the buildings to be $3 \times 2\frac{1}{2}$ inches on wall plates.

The front door in the centre building to be a 2-inch panelled door, moulded on the outside, and worked according to the elevations, hung folding on frames 5×5, with two pairs of $3\frac{1}{2}$-inch butt hinges, and provided with lock, chain, and furniture, and two 10-inch bolts.

The two other front doors, as also all other external doors (if not otherwise specified hereinafter), to be framed of $1\frac{1}{2}$-inch deal, and battened with inch boards, hung with proper hinges on frames 4×4, and provided with all requisite locks, latches, catches, bolts, and other necessary furniture.

The door of the refractory cell to be of oak, with cross straps of iron every 6 inches, to be hung with proper hinges on frames 5×5, well secured into the stone-work, and provided with strong lock, latch, and bolt.

All the doors in the interior of the building, except the doors of the board-room and office adjoining, and master's parlour and bedroom, to be framed and battened doors, hung upon frames or strong casings with proper strap hinges, with good lock, latch and catch, and bolts

provided and fixed on each. The doors of the board-room, two doors of clerk's office, and of the master's parlour and bedroom to be four-panelled moulded doors, hung with a pair of 3-inch butt hinges on frames 4 × 4, and provided each with lock, latch, and furniture.

The dead-house and all the privies to have battened doors, and provided with locks and latches.

The water-closet near the board-room, and which is intended for the use of the guardians, to be fitted up with 1-inch clean deal seat riser and flap, skirting and all requisite bearers and pipe casings, and the joiner is to attend on the plumber while fixing his work.

The whole of the windows throughout the several buildings to have $1\frac{3}{4}$-inch sashes, oak sunk sills, and pulleys, &c., for single hanging to be well wooded, so as to exclude the weather.

The windows of the board-room, clerk's office, master's parlour and bedroom to be hung double.

Cast-iron windows properly secured in the stonework to be provided and fixed in the refractory cell and dead-house over the doors.

The whole of the windows throughout the buildings to have proper fastenings provided and fixed to each.

The window sashes and frames for the openings in the boys' and girls' day-rooms and sleeping-rooms to be worked similar to the other windows, but only to the size described in the specification of the masons'.

The fanlight over the front entrance door to be framed same as door, and filled with St. Helen's glass. The dining-hall is to be lighted by six skylights, three on each side of the roof, and each 5 feet long and 2′ 6″ wide, to be properly framed and fitted in with rough plate glass, and very great care must be taken to prevent them from admitting the rain.

The laundry, washhouse, kitchen, scullery, and store-room to be each lighted by two skylights, one on each side of the roof, and of the same size as those last described, and filled in precisely the same with thick, rough plate glass. The landing at the top of the staircase leading to the girls' dormitory to be lighted by a framed skylight as shown on elevation, as also the landing running by the door of the board-room towards each of the dormitories, likewise shown on elevation.

The staircases to have inch oak treads and deal risers upon proper carriages, with plain $2\frac{1}{2}$-inch handrails, newels, and deal square box balusters, with a sufficient number of iron balusters introduced to ensure strength.

The outside gates to the several courts to be framed of Christiana deal, and battened, hung upon iron hooks inserted into the stone piers, and provided with proper bars, bolts, and locks to each.

To provide all necessary wood bricks for fixing, finishing, and all frames, and to provide good, sound, and sufficient lintels to all the several openings not otherwise specified, extending 8 inches on each side beyond the opening.

To provide and fix all other necessary fittings and finishings incidental to carpenters' and joiners' work, together with all grooving, rebating, framing, tonguing, housing, beading, mitring, and all other jobbing and workmanship necessary for thoroughly completing the work.

The whole of the privies to have inch clean deal seats and flaps.

SLATER AND PLASTERER.

The roofs of the whole of the building to be covered with seconds slates 24×12 (except some other smaller sizes be ordered to be used by the architect), and

some of the back buildings to be nailed with two zinc nails, each on sawn ribs $2 \times \frac{1}{2}$, to have a 4-inch lap, and the lower course to be secured by cement.

The whole to be well rendered.

All ridges to be covered with slate ridge rolls and slabs from quarry, properly secured, laid to fit the pitch of the several roofs. The ceilings of the board-room, and clerk's office adjoining, and the master's parlour, to be finished three-coat work, and all other ceilings two coats.

In the dining-hall, kitchen, scullery, store-room adjoining men's and women's workrooms, washhouse, laundry, the two receiving wards, and in the schoolroom, there will be no ceilings.

The internal walls of the board-room, clerk's office, master's parlour and bedroom, the inside walls of all the wards in the infirmary, and the inside walls of the guardians' water-closet, and the walls of the entrance hall and principal staircase to be plastered three-coats' work.

All the internal walls to have one good coating of plaster and trowelled off, and afterwards whitewashed.

PLUMBER, GLAZIER, AND PAINTER.

All the chimney stacks and walls abutting upon the several roofs, and also all skylight frames, and the backs of all gables to be stepflashed with lead 5 lbs. to the foot superficial.

Four-inch cast-iron gutters to be provided and fixed to all the eaves throughout the buildings with proper fall, and cast-iron down spouts wherever ordered by the architect. All proper and sufficient lead piping to be provided and fixed wherever ordered by the architect, for supplying the whole of the premises with water from the different cisterns to all sinks, wash trays, water-

closets, and privies, with brass taps in every instance, to provide and also fix all necessary soil pipes, overflow pipes, and others to communicate from sinks, water-closets, privies, wash trays, and cisterns with drains, to provide and fix brass taps in washhouse, scullery, and elsewhere if required, and to do all kinds of plumbing work necessary for completing the whole systematically. The contractor must also provide and lay down the lead piping from cistern by to tank under force pump, also provide and fix the pump and all requisite piping to and from the cisterns. Common earthenware trap pans, and all necessary pipes, cranks, levers, and brass taps to be fixed in each of the paupers' privies or water-closets; blue service pan and apparatus in guardians' water-closet.

The windows in the board-room and clerk's office, adjoining the relieving officer's and waiting-room, and in the master's parlour and bedroom, to be glazed in putty with second glass, and the whole to be cleaned and left whole at the time of delivering up the work.

To knot, pummice down, smooth, and afterwards prepare all the wood and other work intended for painting.

The whole of the external work to be painted three coats, and the internal two coats, in oil self colours, to be chosen by the architect, with the best oil and colour, as well as all the other works that are usually painted.

The door and five windows in the front of the centre building to be oak, painted, grained, and varnished.

REMARKS.

The contractor will be required to keep a competent person, to be approved by the architect, continually at the building during the progress of the works, and who will have to receive instructions from, and act in every

way under, the direction of the architect, and according to the instructions he may from time to time give him, and strictly to carry out the works according to the plans and specifications; and the architect shall have power to discharge such person from the works, provided he does not obey the instructions which he receives, or does not carry out the works in a proper, substantial, and workmanlike manner, according to the plans, elevations, sections, and this specification, and to nominate a fit and proper person to succeed him.

The drawings and specifications are intended to convey all the necessary information for the thorough completion of the works, but, should any alteration be hereafter made by the order of the Board of Guardians or their architect, by varying from the plans or the foregoing specification, either by adding thereto or diminishing therefrom, or otherwise however, such alteration shall not vitiate the contract hereby entered into, but the value of the same shall be ascertained by the architect, and added or deducted from the amount of the contract, as the case may be; nor shall such alterations, either in addition, diminution, or otherwise, supersede the condition for the completion of the whole of the works, but the contractor, if such alterations, of whatever sort, require it, increase the number of his workmen, so that the same, as well as the works contained in the above particulars, shall be completely and satisfactorily finished, and so delivered up to the Board of Guardians on or before the ; on failure thereof, the contractor shall forfeit and pay to the said Board of Guardians the sum of pounds for every that the work remains unfinished and undelivered as aforesaid, which sum the said Board of Guardians shall be allowed to stop as liquidated damages out of any money that may be due and owing

to the said contractor on account of the works; and it is an express condition that the whole of the building must be roofed and slated by the .

The whole of the materials of every description, which must be of the very best quality, to be provided by the contractor, and all the works must be executed to the perfect completion of the building, &c., in every respect in the best and most workmanlike manner, to the entire satisfaction of the Board of Guardians and their architect.

The contractor will have to pay to the architect three guineas for a copy of this specification on signing the contract.

VII.—*Specification of Works required to be done in the erection and completion of a* PAIR OF SEMI-DETACHED VILLAS *for at , according to the Drawings this day signed by the Contractor, and the Contract referred to in the Memorandum written at the foot hereof.*

The several works required to be done are shown on the drawings, numbering from to , or are described in this specification.

The	tint indicates	. .	brickwork.
The	,,	. .	woodwork.
The	,,	. .	stonework.
The	,,	. .	slate or metal.

In all cases the dimensions marked on the drawings are to be followed in preference to the scale, and detailed drawings already given, or hereafter to be supplied, in preference to those of smaller scale.

The ground line on the elevation, from which the

heights in the building are counted, is to coincide in its level with the surface of the ground at the point where the party line between the houses produced meets the back line of the nearest footpath.

EXCAVATOR.

The earth to be excavated the required depth for the footings shown, and the trenches for the concrete; the bottom to be well rammed down, and the surplus earth used for making up the levels of the ground about the building.

A layer of 6″ thick of rough gravel, or other hard approved material, to be laid to form a sound bottoming to the walk from the gates to the steps. All necessary excavation to be made for drains and rain-water pipes and tank, the drains to enter the cesspool in rear; the soil pipes to be of 6″ diameter, of glazed earthenware; four inch rain-water pipes to be laid, with a fall towards a slate tank let in the ground. The positions of the drains and cesspools and the rain-water pipes and tank are shown in the block plan, the former being indicated by and the latter by lines. A waste pipe from the sink, and a 3-inch waste pipe, to be fixed at the upper part of the tank into the drain close by to carry off the overflow of the same, and to be provided with a syphon trap.

The ends of all the drains must be trapped, the pipes to be of the best quality, and no bent, cracked, or misshapen or old pipes will be suffered to be used. The joints to be made good with well-tempered clay; syphon traps beneath the water-closets.

The whole area enclosed by the building is to be excavated and levelled uniformly, so as to allow of the free circulation of air beneath the basement floors. The

filling in to be well rammed down about the foundations, and the buildings to be left in a completely finished and habitable condition.

CONCRETE.

Concrete foundations are to be put in in the situations and dimensions shown on the drawings, and a stratum 3 inches thick of concrete is to be laid on the entire space under the basement floors, whether of wood or paved, leaving a clear space of not less than 3 inches under the bottom edge of joists. It is to consist of parts of gravel screened with a screen having a mesh, no stone larger than an egg, 2 parts of approved coarse clean sand, and 1 part of fresh well-burnt lime. The lime to be ground to powder without slacking, the materials to be well mixed together, dry, at the spot, and just sufficient water added to give the consistency of mortar; they are to be immediately precipitated into trenches from a height not less than 6 feet, then puddled quickly to a level, and left totally undisturbed until hard and ready to receive the footings of the structure.

BRICKLAYER.

The bricklayer's work includes all bedding of plates and building in iron hooping and rough York stone core or corbels, and for corbelling and cutting away, and for using cement, and fixing stoves, coppers, &c. &c.

The brickwork generally to be done in a good, sound, and workmanlike manner, with sound, hard-burnt grey stocks, or other bricks as hereinafter specified, laid in Flemish bond, the joints well flushed up, and occasionally grouted with lime. All bricks to be well bedded and worked to a gauge of four courses to a foot in height. No burrs, clinkers, misshapen, place, cracked,

and stony bricks will be suffered to be used, but all to be hard and sound, the best of their several kinds.

All the bricks used for the external walls above the ground line to be of the best white and red perforated bricks, made by the machine, and punched with holes, those of the party walls and underground works and brick-nogged partitions may be of common stocks. The red bricks, forming quoins round the window and door opening, to be laid alternately, one brick and a header, and one and a closer.

Those at the angle of the building to be laid alternately, a brick and a half, and a brick and a closer.

The recess round the front windows and doors of the ground floor, and in the centre of the pair of houses, and on either side to be inches deep, to the doors inches wide, and to the windows and central division inches wide.

The arches in the front elevation to be gauged and rubbed and set quite closely, the other arches of the back and side elevations to be plain axed arches, coloured and tuck pointed.

The whole of the principal front, including the return of the red brick, quoins, and the wall and piers of railing next road, to be painted with white putty, the side and back elevations to have a carefully struck flat ruled mortar joint. The footings to be formed of offsets of each course in height on the concrete, with which the trenches are filled to a depth of inches, and which is to be formed of parts of burnt clay, and of stone lime, well mixed together with fresh water, and thrown into the trenches from barrows 6 feet above the ground.

The front and party walls to be inches thick to the underside of the first floor, the other walls to be inches thick to the underside of the ground floor only, and inches above that level. Brick fenders

and sleeper walls for the basement, fireplaces, and floors, and ½ back trimmer arches to be turned before all fireplace openings in the upper floors. Cast-iron air bricks to be built into the walls of the basement beneath the floors, to admit of the free circulation of air. Four air bricks, one above another, to be fixed on each side of the coal-cellars under the front steps, for light and air.

Also four into closet, under basement stairs, similarly fixed. Cast-iron chimney bars to be built in over all chimney openings. The course of the flues is shown by dotted lines in the section. All flues to be well pargeted and cored and cleaned out after completion.

Discharging arches to be turned over all lintels and openings.

A tier of iron hooping bond to be built in all round the outside walls, at the level of the first floor, consisting of two courses of two lines each, and the hooping to be an inch wide by $\frac{1}{20}$ of an inch thick, or their equivalent, to be well tarred and sanded before laying, and bedded in Roman cement, two of the lines a course of brickwork above the other two, and the two lines in each course to be cross-tyed together and well tapped at junctions.

The ½ brick partitions in the basement and ground floors to have bond timbers built in them
heads and sills.

Provide in each of the back areas a 20 gallon copper, with furnace and door complete, and setting with spiral flue, entering (as indicated in the section) into the kitchen flue, a damper to be provided and fixed in a convenient position, to shut off the communication of the cold draught when not in use.

The area walls to have a brick on edge coping set in cement, except the back area wall, which is to be coped with stone. The floor of the coal-cellar under stairs and front areas to be paved with bricks laid flat in sand, grouted with lime.

The mortar used to be formed of one part of fresh greystone lime to two parts of clean river sand, and mixed together with fresh water, and no more to be mixed in one day than is sufficient for that day's consumption.

The Roman cement used is to be of the best quality, and mixed with an equal proportion of sand.

The front railing to be supported on a inch dwarf wall, with standard piers as shown, each end terminating in a pier inches square.

MASON.

Rubbed York stone sills, 4 inches deep, weathered and sunk and throated to all the windows except those in areas, which are to be tooled only.

The ground floor window sill in front to be of Portland stone, with a moulded edge, and to project inches from the face of the wall, supported beneath by stone brackets, to be mortised to receive a balcony railing.

Rubbed Portland stone steps up to the front elevation entrance doorway, inches treads, and inches rise, Portland coping on either side of the same.

Tooled York steps to back entrance and down to back area, which is to be paved with rough York paving. The scullery with York paving, tooled.

A stone sink to be here provided, sunk out inches, and supported on an upright piece of York, with a hole for bell trap.

Caen stone keystones, inches deep and inches thick. A Caen stone string course inches deep, projection to front elevation, ditto caps to end piers of railing in front.

Tooled York coping to back area, with mortises to

receive the posts for the iron railing above, inch rubbed York stone coping to front enclosing wall, rounded top. Portland stone front hearths to the ground floor rooms, rubbed and York back hearths; rubbed York back and front hearths to all other fireplaces.

Provide and fix in the front room of the basement a plain boxed rubbed Portland chimney-piece, jambs, and mantel inches wide, shelf inches wide.

On the ground floor marble chimney-pieces, value *l.* each, to be provided.

In all the other rooms plain rubbed Portland chimney-pieces to be fixed, the jambs and mantel inches wide, and shelf.

The kitchen to have an arched mantel and wood shelf, supported on brackets, inches wide.

Rubbed York stone divisions to chimney caps.

SLATER.

The roofs to be covered with slates, and nailed with composition nails to slate battens, well dressed on the edges, and of uniform colour and quality, every third slate to lap over the first at least 3 inches.

The hips and ridges to be covered with slate inch thick, and screwed to the top of the ridge piece, and most carefully jointed and stopped in oil cement. A slate roll on top covering, the meeting joint screwed down and jointed and stopped in like manner.

In the ground sunk the requisite depth, a rain-water tank is to be fixed deep internal dimensions, formed of bottom and sides, and arched on top (bolted with bolts at end, and tarred and sanded), grooved and put together with oil

cement, holes being made for the reception of the rain-water, service, and waste pipes.

The slater is to include all and every expense whatever for securing and fixing his work, and for making good and cutting away, and leaving all perfect.

CARPENTER.

All the timber used, except otherwise described, to be of the best sound and well-seasoned Baltic fir, Memel, Riga, or red American pine, free from sap, and shakes, and dead knots. The deals to be from Christiania, and the oak of English or Irish growth, sound and well seasoned, close grained. No dessicated timber will be allowed to be used.

Oak plates $4'' \times 3''$, to be laid on the sleeper walls, and piers of the basement to carry the joists for the flooring.

The scantlings of the joists of the basement to be . Those of the ground floor, first floor, and hall, , except that part over the hall where the joists are . Those of the attics , except over the small rooms and landing of stairs, where they are to be . In all cases, the trimmer joists to be $\frac{1}{2}$-inch thicker. All the timbers to be laid to a gauge of $12''$ from centre to centre.

The plates above the ground floor to be of fir , the $\frac{1}{2}$-brick partitions to have bond timber built in them, , as aforementioned in bricklayers' work.

All the 3-inch partitions to be formed of quarters 12 inches apart , with braces head and sill, lintels inches deep, and inches wider than their respective openings. A row of herringbone strutting down the floor of each room, above the basement.

The roof to be formed in the manner shown in the

drawings, plates and angle ties halved and spiked into them at the four angles of the roof, , purlins , ridge piece , common rafters , collars dovetailed to the rafters, which are to be securely notched down to the plates.

The roofs to be battened with battens for slates, and eaves board and tilting fillet.

The eaves of the roof to project inches all round, the facia to be inches high, and with the soffit, to be of stuff wrought and beaded.

Solid-cut brackets inches wide, agreeably to drawing, to be provided and fixed to the soffits, and built into the wall inch, and to be fixed in the positions shown in the elevations.

A dormer window to be constructed in each of the attics with uprights on the sides, halved and bolted to the rafters, and rough boarded to receive zinc covering, stout frame and sill complete.

Over the water-closet a cistern is to be formed of stuff on proper bearers, deep, internal dimensions.

The fences to be formed of fir posts , and feet apart, and rails, with fir palisades fixed inches apart feet high, and twice tarred. The front garden to be divided by wrought posts united by a chain only.

JOINER.

Attics.—The floor to be laid with white deal boards, laid folding, an inch square skirting, inches high all round.

The doors to be of yellow deal, framed square in panels, the upper one glazed with ground glass, and hung with butts to rebated and beaded

jamb linings, with a moulding round for architrave, and provided with rim locks.

The casements in dormers to be of deal, ovolo hung, with butts to the side posts, and provided with fastening and hook and eye to fix when open. The spandrel pieces in each side of dormer to be boarded with matched and beaded boarding, wrought one side with a bead at the angle to stop the plaster against. A louvre casement to be fixed in the position where indicated in the attic plan .

Small closets to be formed of deal, framed square against the angle-tie plates, with hinged door, and provided with brass turnbuckle.

First-floor Rooms.—The floors to be all laid with inch white deal battens laid straight joint, with mitred margins to hearths, an inch, square skirting, inches high round all the rooms and landing.

The doors to be of inch deal, framed in panels and square (except those opening on to the landing, which are to be moulded on that side only), and hung with butts to rebated and beaded linings, with a inch moulding round for architrave, and provided with a rim lock and brass handles.

The closet doors to be of deal, framed square in panels, and provided with brass turnbuckles.

The sashes to be of inch deal, ovolo hung, with patent lines, and brass axle pulleys to wrought, and beaded deal-cased frames on wrought and weathered and sunk oak sills. A inch moulding for architrave to be fixed all round, and stopping on a window ledge fixed to the back of oak sills. Spring brass sash fastenings to each window.

A trap door to be fixed in the floor of the small bedroom at the back, immediately over the cistern above the water-closet.

Ground-floor Rooms.—The floors to be covered with inch yellow deal battens, laid straight joint, with mitred borders to hearts, deal moulded skirting inches high, fixed to ground round all the rooms and hall, inch, square skirting, high to water-closet.

The doors to be of inch deal, framed in panels, and moulded both sides, and hung with inch butts to rebated and beaded jamb linings, and provided with brass mortise locks, with white china handles and finger plates.

In the partition between the front and back parlour, a pair of folding doors of inch deal, moulded both sides, in panels, to be hung with inch butts to the lining, provided with mortise locks and white furniture.

An architrave moulding inches wide, on grounds, making the whole inches wide, to be fixed round all the doors and windows of this floor, except otherwise specified.

The front entrance door to be of inch deal, bolection moulded outside, and bead flush inside, in panels, and hung with inches butts to solid rebated and beaded door post, let into the stone step below, a inch mortise drawback lock complete, and pinch-barrel bolts. The internal jambs to be splayed about inches to allow the circular head of the door to open freely back. The architrave inside to match the others, but the grounds to have a sunk head in the spandrel formed above.

The back door to be of inch deal in panels, the upper pair glazed, to be moulded inside and bead butt outside, with architrave round same, and to be hung with inch butts to solid, rebated, and

beaded door posts, and with similar lifting shutters.

The water-closet door to be of deal, and moulded outside to match other doors looking into hall, but square inside, with moulding round only, and provided with a spring lock and bolt.

The sashes to be of inch deal astragal, and hollow, and hung with patent lines and brass axle pulleys to wrought and beaded deal-cased frames on wrought and sunk weathered oak sills, and provided with sash fastenings (spring and brass), one architrave moulding round same grounds.

The circular-headed window in front to match, but to have a sunk head in the spandrels of grounds similar to the front door, and to be provided with deal shutters, panelled and moulded front flaps, and inch deal square back flaps, and hung with butts, and provided with spring fastening.

The casement in water-closet to be of deal ovolo, hung with butts to the frame on oak sunk sill.

The water-closet to be fitted up with Honduras mahogany seat, riser and flap, French polished, with hole cut and beaded handle box, and to have beaded brackets and elbows high. The whole to be put together movable.

A quadrant closet to be formed in the other corner of the water-closet with washhand basin, and plug, and chain, and drain therefrom, supplied with water from the cistern above by a small pipe terminating in an iron tap fixed over the basin.

Basement Floor.—The floor to be laid with inch white deal battens laid folding, with mitred margins to hearths, inch square skirting, inches high to front room.

The doors to be of deal, panelled and square, hung to linings, with a inch moulding round for architrave; iron rim locks.

The outer door to be inch deal, framed, bead butt, and square, hung with butts to solid rebated and beaded door posts, and provided with thumb latch and inch bolts.

The front windows to have deal ovolo casements, one of which to be hung to the solid mullion in the centre, the other to be fixed to the solid frame ; one oak sill, sunk and weathered inch bead, butt, and square shutters to turn back against the wall, inside hung with butts.

The other windows to have deal sashes, hung with patent lines and brass axle pulleys to deal-cased frames on oak sunk and weathered sills; inch moulding for architrave round same.

Shutters to the kitchen window only similar to those just described for the breakfast-room. The casement to larder to be fixed and filled in with perforated zinc; two shelves to be fixed in the larder. A closet to be formed with shelves in the position shown in each kitchen, the fronts to go up to the ceiling.

A dresser long and wide, with wrought and tongued and beaded legs square, with beaded frame above, fitted up with drawers inches deep, with deal pot board below on beams to be provided and fixed in the kitchen; plate shelves of the same length to be fixed over the dresser.

The Staircase.—The basement stairs to be wide, with inch treads and risers, with rounded nosings housed into the outer strings, over which

square deal balusters to be fixed and not closed up, that the window may give light to the whole passage.

A square door in panels, with turn buckle, to be formed in the square framing inclosing the space under stairs, forming a closet.

The principal staircase to be feet wide, with inch deal treads and risers, tread inch rise, with moulded and returned nosings, wrought and beaded wall string.

The stairs to be well glued and blocked together, and fixed on strong fir carriages.

A Honduras mahogany hand rail, French polished, to extend from top to bottom, and round the landing above, finishing on the ground floor with a butt nose scroll and a quadrant step; deal square balusters, with an occasional wrought iron one, to stiffen the same.

The attic stairs to be similar to basement stairs, on carriages, under which the closets of the first floor rooms are situated.

The spandrel formed by the rise of principal staircase to be filled in with one deal panelling, moulded on the hall side and square on the other, in which is the door to the basement stairs, formed of deal, moulded one side, panelled, and hung with butts to the framing, and provided with lock.

SMITH, IRONMONGER, AND BELLHANGER.

Round all the eaves put 5-inch ogee moulded cast-iron gutters, to be fixed with angle pieces and lion-head clips; the heads to come over each of the brackets, and at regular distances between, where necessary.

Four-inch cast-iron rim water pipes without heads, but connexion made by a zinc tube passing through the

eaves and soldered into the back of the gutter, thus passing through the facia into the down pipe (see detail drawing), full size leading, and properly connected to the slate tank.

An ornamental balconet railing to the front window of the ground floor.

An iron railing of pattern chosen to be provided and fixed on the stone coping on dwarf wall in front, inch round bars, inches from centre to centre, and occasional standards, thick, with back stays, and run with lead. Horizontal top rail, thick, from top of stone coping.

A gate opposite the entrance to each house to be fixed in the railing wide, with wrought frame, to be provided with lock and keys.

A perforated cast-iron coal plate and fastenings to be fixed over shoot in a stone inches square.

Provide cast-iron bricks to ventilate floors of the basement for each house, also other air bricks to admit light and air to cellars.

. cast-iron bars to be built into the work, one in front of the larder window, one in front of basement staircase window, one in front of scullery window.

Provide register stoves, value each, for the bedrooms, for the front room in basement, for the parlours; a range, with oven and boiler, for the kitchen.

Provide a bell board in the basement hall for bells, and one in back attic.

Provide one pull from the gate, and one from front door, from ground floor, from first floor to basement, and from first floor front room to the back attic bell.

PLASTERER.

The ceiling and soffit of principal staircase to be all F. R. P. set and whitened.

The walls to be all rendered, floated, and set for paper.

The bond timbers of the half-brick partitions to have plaster nails driven into them, to form a key for plastering.

The inch quarter partitions to be lathed and plastered, floated, and set for paper down to skirting.

In place of wooden angle staves, all the arrises to be run in Keene's cement.

The front room in basement, and the first floor bedrooms, to have a small moulding for cornice all round the rooms and landing of stairs.

The parlours on the ground floor to have a cornice inches girth.

The walls of the scullery to be twice coloured in distemper.

The chimney stacks to be capped with York stone divisions set in Roman cement, forming splay. (See drawing.)

The plasterer's work includes all cutting of moulds for running cornices, and rubbing and bracketing out where necessary.

The plaster and hair must be very well mixed together, and sufficient time allowed for their amalgamation; the lime to be well ground.

Cement filleting to be used wherever it is required, and carefully executed.

PAINTER, PLUMBER, AND GLAZIER.

The paint to be all mixed with the best white lead and linseed oil; all the woodwork throughout the house

to be well rubbed down with sand paper, and stopped with putty.

Internally the doors, sashes, skirtings, closets, and all woodwork usually painted to have coats of paint, finished a clear stone colour, except the ground floor rooms, which are to be grained wainscot, and twice varnished.

All the doors looking into the hall to be similarly grained and varnished, but not the architraves round the same.

The spandrel framing inclosing stairs to be grained and varnished.

The Portland stone chimney-pieces to be similarly painted and grained dove marble.

The bars of the stairs to be painted coats, finished a dead white. Externally, all the woodwork to have coats. The frames of the windows and doors to be finished a dead white. The casements and sashes of back doors a . All the iron-work to have coats.

The woodwork of the eaves, cantilevers, and iron gutters and down pipes to be finished a colour.

The front door to be grained to imitate , and twice varnished; the iron railing in front and back to be finished a .

PLUMBER.

The water-closet to be fitted up with the best pan apparatus, with blue basin, D trap service, box, cranks, cistern valves, ball lever, &c., all complete, with brass handle, inch supply pipe, and inch soil pipe entering drain.

The cistern over the water-closet to be lined with lb. milled lead; lay on the water from the well to the cistern, and lead it thence to the sink and water-

closets, providing and fixing in a proper manner in scullery a inch lift and force pump, with brass barrel plank, warning pipe, &c., complete; the pipes to be of lead, and of the best manufacture, the suction inch in the bore and the service inch, both of approved strength, the service to sink inch in the bore, and weighing not less than lbs. to the feet length, to be securely fixed, and the brasswork of best and approved make, inch trumpet-mouthed standing waste pipe leading to and S trapped at soil pipe, inch bib cock and bars to each sink, and inch brass grate and bell trap, with waste pipe to drain.

Best oz. zinc covering and flushing to the dormer windows in roof carefully jointed, and soldered zinc flushing round chimney stacks.

Put lead in a proper manner wherever it is obviously necessary to make the roofs, water supplies, and discharges all secure and water tight, using all solder wall hooks, holdfasts, brackets, lead-capped nails and tacks, that may be wanted to carry out completely whatever appertains to the plumber's branch.

GLAZIER.

The front and back windows of the two parlours to be glazed with the best flattened sheet glass of even texture and surface, free from air bubbles and every imperfection.

The back doors of the same floor to be similarly glazed.

The attic doors and the water-closet window to be glazed with ground glass.

All the other windows to be glazed with the best crown glass.

PAPERHANGER.

The paperhanging is not to be included in the contract.

This is the specification referred to in my contract with , dated this day of , 18 .

Schedule of Prices.

	£	s.	d.
Excavation per yard and levelling, cube			
Concrete „ cube			
Reduced brickwork, per rod			
Bricknogging, per yard			
Stock brick paving flat, per yard			
Gauged arches, per foot			
Brick trimmers in cement, per yard			
6-inch glazed pipes (include digging), per foot			
4 „ „			
Bedding window-frames			
Slating, per square ( )			
Slating battens, per square			
slate tank, per foot			
Fir timber in framework, per foot cube			
Oak „ „ „			
Door case, per foot cube			
inch dovetailed cistern, per foot			
Fencing, per perch			
white floors, laid, per square			
„ „			
Sashes and frames, per foot			
2-inch 4-panel doors, double moulded			
Square framed shutters, 1¼ per foot			
closet fronts and doors, per foot			
Render, float, and set, per yard			
Lath, float, set, and white			
inch cornice, include mitres			
York paving square and laid, per 100 feet			
Portland mould steps, per foot			
inch Portland stone, per foot			
Boxed mantels, each			
Marbles „			
York landings, per foot			
Stone brackets, each			
York window-sills, per foot			

Ironmongery.

	£	s.	d.
Balcony railings, per foot			
Handrail, per foot			
Ranges, each			
Eaves gutters, per foot			
Air-bricks, each			

Painter.

Oils flatted, per yard			
„ grained „			
„ green „			
Tar, per yard			

Plumber.

Lead laid, per cwt.			
Zinc, per foot			
inch supply pipe, per foot			
inch water and joints, per foot			
inch service, per foot			
Pump complete			
Pan and apparatus complete			

Glazing.

Flattened plate, per foot			
Ground glass „			
Newcastle crown „			

This is the schedule of prices referred to in my contract with , dated this day of , 18 .

VIII.—*Specification of Labour and Materials to be used in the erection of a proposed* SLAUGHTER-HOUSE, *with the necessary Sheds, Sheep Pens, &c. &c., together with a small Cottage, the whole to be erected upon land yards to the side of the and about from . according to Drawings prepared by and to his entire satisfaction.*

Where figured dimensions are given they are to be adhered to, notwithstanding any difference there may be between them and the scale.

EXCAVATOR.

Excavate to the necessary depths and widths for the various footings, for the water well, dung pit, blood tank, and for the surface drainage, as shown on drawings; excavate to an average depth of feet for yards run, for laying inch drain pipes, to serve as water supply to well.

Form the surface of yard to a regular inclination all ways to the traps, as shown on plan.

Prepare ground in sheep pens, in pigsties, and in sheds to receive paving, the surface of which is to rise 6 inches from the front to the back.

Level the trenches for all walls, and if required, ram them.

Fill in and ram down earth to all walls, piers, &c.

BRICKLAYER AND STONEMASON.

Build the walls to the heights and of the widths shown on drawings, of native rubble lime stones, the stones to be well bedded and jointed in mortar, having the internal and external joints neatly struck, and the work left fair.

The mortar to be composed of 1 bushel of lime to 2 of sand, thoroughly incorporated.

The footings (where any are shown) to be built of the largest stones, and the beds generally to be laid as nearly horizontal as possible.

All reveals, whether of windows or doors, as well as all lintel stones, piers, openings in walls, &c., are to be worked with return faces, neatly hammer-dressed.

Lime stone hammer-dressed lintels, wherever shown or described, are to be inch in thickness, and in depth and height varying as follows: for openings under they are to be inches deep, and longer than openings; for openings under

they are to be inch deep, and longer than the opening; and for openings above they are to be inches deep, and longer than openings.

The piers between gates of sheep pens to be built with especial care, using the best stones, and laying them horizontally; the same precautions to be observed in building all detached or semi-detached piers.

The pier to shed is to have footings.

The piers to entrance gates to be worked with a projection as shown, having the joints and arrises worked, and to have plinth and cap as shown.

Put to the two gables of cottage and to the two gables of slaughter-house tooled lime stone coping, 3-inch thick and 15 inches wide, dowelled at every joint with slate dowells set in cement, with corbels as shown, inches thick, to stop the gutter; the whole to be set in cement.

To all other walls put a rough coping, as shown, with stones, inches deep, and projecting on each side of wall.

Work the chimneys, as shown, in the best fire brickwork, the projecting parts and the top courses being set in cement.

Fix lime stone lintels (of sizes as before described) over all openings, unless otherwise shown or described.

Insert in wall while building pieces of sawn slate as sills, long, inches wide, and inches thick, to project inch on the outside of wall, to all the small openings in the slaughter-house and in the boiler-house. Insert in these openings, also, the necessary iron and woodwork, for which see details.

Arch the doorways for door in slaughter-house and boiler-house with rings of fire bricks set in cement, and inches thick.

Build in solid fire brick the two boilers, taking the foundations to bottom of footings, and construct fireplaces, flues, &c., and insert all ironwork, the top of boilers to be from the level of ground.

Finish the openings in sheep pens by way of sill in cement, worked sloping.

Finish the low walls of pigsties with coping, similar to adjacent walls.

Build blood tank, as shown in detail, carrying down adjacent wall, and building remaining wall (see detail).

Dig where directed, and sink a well inches diameter, and covered over with a manhole and York stone cover, with ring.

Lay the various drains shown on drawings, yards in length of

Provide cesspools where indicated by feet deep in the clear, with strong gullies and traps.

Build manure tank where and as shown, carrying the adjacent and front walls lower than other works, the front wall to be only higher than ground line.

Provide and fix spurstones rounded at top.

Pave the yard, sheep pens, pigsties, and cart sheds with good large paving-stones set in sand, thoroughly rammed, and the surface left true.

Bed all plates, lintels, door frames, window frames; bed the latter in lime and hair, mortar, wood bricks, and generally all wood or iron work that may be requisite; do all beam fitting.

Provide the sum of 15*l.* for excavating for and building a cesspool complete.

The walls of house on the two external faces are to be coursed as shown.

Build the privies, dust bin, and coal place as shown;

build cesspools under the privies, of the proper size and with sufficient fall to dust bin.

Build $4\frac{1}{2}$ fire brick trimmer arches to fireplaces in chamber story, and proper foundations for hearths on ground floor.

Build the partitions, as shown, of half fire brick.

Put 2-inch slate hearths and back hearths to all chimney openings, and of the size shown.

Pave the slaughter-house and boiler-house with brick on edge paving, laid to proper fall in mortar.

Pave the living room with inch square tiles laid in mortar, on a inch bed of dry rubbish, and lay the scullery and privies with slate, inches thickness, jointed in mortar.

The door sills to be paved with the same materials as the rooms; pave the porch with inch slate.

Build in a copper with solid brickwork, inserting fireplace, damper, &c. &c., complete, where shown on drawings, in scullery.

Provide and fix in scullery a sink stone, sunk, and having a hole for trap and waste pipe.

All framed trusses are to rest upon limestone templets, not less than long, inches thick, and inches wide, unless otherwise expressed.

Turn, core, and parget all flues.

Fix as may be directed cast-iron brackets, as sketch in margin, to be fixed in wall of slaughter-house.

Ditto, ditto, iron hooks near bottom of wall in slaughter-house, let into large stones, and run with lead.

Fix slate cistern where shown, having sufficient bearers, and being well secured to walls.

Provide *l.* for cottage chimney-pieces.

SLATER.

Cover the roofs with the best slates laid on battens to a proper bond and gauge, each slate to be secured with zinc nails, and to have a cap.

Cover all ridges with proper plain ridge tiles, laid securely in mortar.

Lay all eaves double, and run cement filleting on slates wherever they abut against walls, nails being first driven in to afford a hold for the cement.

Provide a cistern to hold 250 gallons, of sides, and bottom, put together with slate cement, grooved at joints, and secured with inch wrought-iron rods, nuts and screws, &c., with two holes cut for service pipe, and one for waste pipe.

CARPENTER AND JOINER.

All the timber for the carpentry to be of the best Baltic fir, free from sap, shakes, large, loose, or dead knots, and all and every defect. The deals for the joinery to be of Quebec yellow pine, free from sap, well seasoned, and without defect. The timbers to be sawn die square, and to hold the described dimensions when fixed.

Provide and fix framed trusses for the slaughter-house, and ditto for the boiler-house of the following scantlings, tie beams principal rafters, king post out of struts resting on the stone templets before described, and built into wall. Wall plates to be , purlins , ridge , and common rafters , each truss to have inch bolts, and strap at foot of king post.

Front bearer to cart shed , to sheds ,

purlin , struts , wall plate , common rafters .

Pigsties and Privies.—Same as described for sheep pens as far as similar timbers are required .

Cottage.—Wall plate , purlin , ridge , ceiling joists , porch roof plate , ridge , common rafters . None of the roof timbers are to be wrought.

Provide all necessary centring.

Frame the roof louver of plates, heads, and post , securely together, pinned with oak pins, and secured at the angles with iron angle straps, and to the timber of roof with iron straps, bolts, &c.

Form the roof for the reception of these ventilations.

Frames , dovetailed together, and louvers , let into stopped grooves secured to plates at the top and bottom, built in with the wall.

Provide one pattern for a cast-iron trellis , ventilation of the same size as the wooden ones, but of patterns to be approved.

Door Ventilators.—Provide two patterns as before, but of different size.

Pigsty Doors.—Provide and fix framed ledged doors of ledges, and matched and beaded battens, hung with wrought-iron strap hinges, well secured to wall, each door having a bolt and padlock.

Gates to Pens.—These gates to be formed of split larches of approved dimensions, one gate to be made as specimen, and approved before others are made.

Provide and fix a tramway according to a detail drawing, with all necessary ironwork as described thereon.

Provide a cover to each boiler of matched deals, with ledges wide, and having a handle on upper side.

Slaughter and Boiler Houses.—Put in these openings doors as follows, stiles , top rail , middle rail , bottom rail , framed and grooved to receive matched and beaded battens let into stiles and rails, and stiffened with diagonal traces; nail the whole well together, and hang to deal soled, chamfered, and rebated frame, well bedded into and secured frame for the iron grillwork above the doors.

Hang these doors with cast-iron straps, steel-point hinges long, and put to each door bolts and good stock lock.

Provide and fix lintels over all openings (except those otherwise provided for) in cottage and elsewhere inches wide and inches in depth for every foot of opening, and also inches longer for every foot of opening than the opening which it is for.

Provide superficial feet of inch shelving and brackets, and fixing where required.

WORK TO COTTAGE.

Joists to chamber floor , having one tier of plain strutting, and resting upon wall plates. Lay inch wrought yellow deal floor, nailed round hearth, and fix a inch square skirting of inch deal round the room.

Fix deal, solid, chamfered, &c., wrought frames rebated, having English oak double sunk and weathered sill to all window openings of the sizes shown, and hang thereto with inch butts plain deal ovolo casements with the usual casement fastenings; finish the windows internally with deal elbows and soffit, and inch window board. Finish porch window (which is not to open) with narrow deal linings in sufficient grounds, and inch deal window boards.

Put all necessary wood bricks.

Lintels, see above.

Put inch angle staves to all angles of windows, chimney breasts, &c.

Put to all external doors deal solid frames , framed and rebated, &c., wrought, and hang thereto framed ledged and braced doors of inch framing, and inch nailed and beaded battening; each door to have inch barrel bolts, stock lock and key, and to be hung with a pair of cross garnet hinges, each door to measure .

Put panel square internal doors where shown, each hung with a pair of butt hinges to rebated and beaded linings, each door having a lock of the value of .

Form a closet at top of stairs high, of inch nailed and beaded battening, having door in same , of similar battening ledged, hung with cross garnet hinges, and screwed with a brass button. Put a top of inch deal, and screw the whole to walls.

Fit up the privies with inch deal seat, riser, and bearers, the doors to be as before described, but with only a bolt, thumb latch, and hinges.

Put a door feet square, hung by inch cross garnet hinges to a frame to the dust bin, and fitted with a button.

Work the entrance gates of the size shown, double hung, of framing, stiles being inches wide, top rail (curved) inches, middle rail inch, and bottom rail , all being grooved for the reception of tongued batten panelling, having braces , the whole to be well nailed together, and hung with wrought-iron strap pivot hinges inches long; put moulded capping, with ironwork scrace, to top of gate. Provide for these gates approved ironmongery,

as follows: long barrel bolts, the bottom one to fit into iron socket let into stone, and a lock of the value of , with keys. Provide also iron stops for gates let into stone, and run with lead.

Put curb round blood tank as shown rebated, and fit into same tongued battens wrought on one side; fix these so as to be air tight, work a small opening in this top, having raised side, and fit thereto a cover of the construction shown, to fit down in an air-tight manner, and to be covered with lead.

SMITH, PLUMBER, &c.

Provide and fix cast-iron trelliswork panels , and secure these to pieces of iron about inch, one at top and the other at bottom, by inch nuts and screws. Provide a similar piece of trelliswork to fit into frame over each of the large doors, as shown.

Provide two boilers of cast iron to hold each gallons, and fit up same with all necessary ironwork, doors, dampers, &c.

Provide all hinges, locks, bolts, straps, &c. &c., anywhere mentioned, or that may be necessary.

Provide to gates of sheep pens a bolt and padlock, and work the pivots of two gates as sketch, that they may be built into the wall to be more secure.

Provide 5-inch eaves guttering, secured on proper clips, to feet of rafters to slaughter-house and boiler-house, with all necessary stopped ends, the junctions being well white leaded.

Put to all other eaves, except those of pigsties, porch, and privies, inch guttering, and as above.

Provide and fix nine stacks of inch rain-water pipes, properly secured and connected with drains, with

out heads, but with lead or irons , and shoes.

Provide and fix rolled iron flitches inches by inches in thickness, feet long, to fit into girders, and perforated as shown for bolts, and provide all other necessary ironwork for the tramway.

Provide all ironwork necessary for the roofs and generally wherever described, as shown.

Provide and fix to a inch plank, secured to wall, a inch force pump connected with well by a inch lead suction pipe feet down well, and having inch lead service to slate cistern. This pump must have a double nozzle or other contrivance, so as to serve as an ordinary pump for the yard.

Provide inch overflow pipe to slate cistern, with tap at bottom; provide also feet of inch service from cistern, and a brass tap of Lambert's patent.

Put a small copper where shown in cottage.

Put feet of inch lead pipe from sink in cottage.

Cover blood tank lid (only) with 5 lb. lead.

Put lb. flashings to cover ventilations inch wide, let into groove. Put lb. lead gutters and flashings to chimneys in cottage roof, and to one in boiler-house roof.

Provide the sum of *l.* for contingencies, to be deducted if not anywhere wanted.

PAINTER.

Paint all the wood and ironwork usually painted in the cottage, &c., four times in good oil colours of approved tint, and the remaining buildings three times

only, as the (wood and iron), the doors to pigsty, the gates to pens, the cover to blood tank, &c. &c., the eaves, guttering, down pipes, &c. &c.

PLASTERER.

Lath, plaster, float, and set the ceilings of all rooms in cottage, and render, float, and set all walls, including those of porch.

Run a plain cement skirting to rooms on ground floor.

Limewhite the privies, the dust bin, the coal bin, the sheep pens, pigsties, cart sheds, slaughter-house, and boiling-house.

GLAZIER.

Glaze the windows of cottage with the best second Newcastle crown glass.

IX.—*Specifications*; *Separate Clauses respecting Materials.*

SAND.

The sand to be clean and sharp, free from vegetable substance, and well screened, if required, through a screen not less than 4 meshes in the inch. If ashes are used, they must be clean, well-burnt furnace ashes.

MORTAR.

The mortar is to consist of one portion of lime, measured dry, and two and a half of sand or ashes; the lime to be carefully screened and slaked, and to be thoroughly mixed with the required proportions of sand or ashes and water in a pug mill, or under edge stones; no water shall be added afterwards.

CEMENT.

To be used fresh, and well mixed with sand in such small quantities as from time to time may be required in proportion to one of cement to one and a half of sand; no water on any account to be added afterwards, and no cement to be mixed or used with any other cement after it has once began to set.

CONCRETE.

To consist of five parts of clean gravel perfectly free from clay or loam, with a proper proportion of small gravel and sand as well as large, and one part of water lime, dry measure; the lime to be thoroughly mixed with the gravel and water.

X.—*General Conditions added to Specifications of Engineering Works.*

The whole of the works are to be done to the entire satisfaction of the engineer to the , and the contractor is to find, provide, fix, and perform, with the best materials of their several kinds, all and every part of the works which are specified, represented, intended, or implied either particularly or generally in this specification and in the drawings herein referred to, and such other drawings as may be given at large by the said engineer, and according to such written or verbal instructions as he may give during the progress of the works; and should any works be described in this specification which are not or could not be represented in the drawings, or should any works be represented or reasonably implied in the drawings which are not mentioned in the specification or described therein, the several works are in either case to be done, and nothing

is to be omitted which is required to render every portion of the works completely finished and fit for the purposes required; and all works which are so requisite are to be considered as included in the contract, unless a specific agreement, at the option of the , should be at any time made in writing to allow the contractor a greater or less sum of money on account of any deviation from lessening or addition to the quantities or quality of the several works.

It is distinctly understood that the decision of the engineer to on all points connected with these works is to be final and decisive between the said and the contractors.

No variation in the execution of the works described, either as regards additions or deductions, is to annul the contract, but such additions or deductions are to be valued according to the scale of prices to be attached to the tender.

The whole of the works described in the accompanying specifications are to be completed in the space of three calendar months from the date of the order being given to commence them, and the contractor will be held liable to a penalty of 1*l.* per day for each day the several works, or any of them, shall remain unfinished beyond the said three months, the amount of such penalty to be deducted from any sum which may be due to the contractor on account of his contract.

The tender is to state in one sum the amount for which the party tendering is willing to execute the works described in the accompanying specifications and drawings.

The person whose tender may be accepted is, if required, to enter into a bond with two eligible securities, jointly and separately to be bound, under a penalty of 500*l.*, for the due performance of this contract.

The do not bind themselves to accept the lowest or any tender.

Tenders sealed up and marked on the outside to be delivered at the office of the engineer, not later than Saturday, the August inst.

Scale of prices referred to in the Specification:

	£ s. d.
Fir timber in	per foot cube
English oak timber in . . .	,,
East Indian teak timber in .	,,
Wrought iron in screw bolts, nuts, and plates . . .	per cwt.
Do. do. in pile shoes . .	,,
Rivets	,,
Best iron	per ton.
Boat plates	,,
Plater	per day.
Riveter	,,
Pile driver	,,
Carpenter	,,
Labourer	,,

XI.

Conditions belonging to Specifications of Engineering Works.

1. The contractor is not to depart from the specifications or drawings; should any dispute arise as to the drawings or specifications, the same to be submitted to and decided by the engineer.

2. The drawings and specifications have reference to and describe a new and with all their appurtenances and connexions, with the exception of the for securing the tops of the and the for the ; but it is to be expressly understood by the party or parties contracting for the work, that whatever portion or part of the

present or shall, on examination, when the water is pumped out, appear to the engineer to be in such a state of soundness or preservation as to make it unnecessary to remove it, or if any part of the timber or woodwork shall be deemed sufficient to be again used in the construction of the new , &c., the same shall so remain or be so re-employed, and the value thereof estimated accordingly to the schedule of detailed prices appended to the contractor's tender and approved of by the board, and the sum or sums deducted from the amount of the contract.

3. When it shall be determined on that any part of the or shall remain or be made use of in the construction of the new works, the value of such portions or parts shall be ascertained and agreed to at the time when such arrangement is come to, and recorded in writing, and signed by the engineer on the one part and the contractor or his accredited agent on the other part.

4. The contractor to find and provide all labour, materials, and workmanship for completing the works, and clear away all rubbish at his own expense.

5. The contractor to take the whole risk of executing the works according to the plans and specifications, and to give due personal attendance, or in his absence to have a duly qualified person to look after the works.

6. Any materials deemed insufficient or improper shall be removed at three days' notice, and any unsatisfactory work to be re-executed.

7. The contractor to find security for the due performance of his work within ten days after his tender has been accepted, and must be ready to produce his detailed estimate on which his tender was made, which must agree to the schedule attached to the tender.

8. The contractor to urge on the works with all due celerity; in case of non-completing in time specified,

the to have power to take possession of everything on the ground, and proceed with the execution.

9. The timber for the and steam-engine, pumps, fittings, and connexions, to be laid down on the premises within four weeks after the signing of the contract.

10. The erecting of the , the framing of the , with all the castings, straps, plates, &c., the erection of the steam-engine, pumps, and dams, pumping out the water in weeks more, or weeks altogether, under a penalty of 30*l.* a week for any time exceeding.

11. When work to the value of one half of the contract has been certified by the engineer to have been performed by the contractor, a payment to that amount, less 10 per cent., will be made to him, and the balance of the contract will be paid when the works are completed and the dams removed.

SECTION III.—ENGINEERING WORKS.

I.—*Specification of Work to be done in erecting a* Sea Wall *and* Flood Gate, *and widening and altering the present* Occupation Stone Bridge *over the River , at , for the .*

Set out the new wall according to the drawings, excavating for the foundations into the clay substratum at least 13 inches; level and consolidate the bottom of the trenches, or step the same level from step to step in case it should not be necessary to carry the foundations to an uniform level throughout. In no case must the steps be otherwise than cut down in a perfectly vertical direction, nor more than 1 foot rise given to each. The wall at the different heights to be carried up to the full thickness shown on the sectional drawings; the true curve of the front towards the sea to be carefully preserved.

The stone used in the work to be of the same kind as that in the existing structure, of an uniform and compact quality, and free from all defects. No stone used in the work to be less than 12 inches in length or 6 inches in breadth or thickness; no pinners* to be used in any part of the work.

The walling to be built in the best manner of *uncoursed* masonry, with through stones, one in every superficial yard of the surface, the sectional area of

* Small pieces inserted to make bond or fill spaces.—J. B.

which shall not be less than 168 square inches parallel to the face end. The face of the work to be hammer dressed to a surface as nearly uniform as possible. The work to be perfectly levelled on the top every 18 inches in height.

The mortar used in the work to be composed of the best lime one-third, and clean, sharp river sand two-thirds, by measure, well mixed and incorporated together. The stones to be carefully bedded, and the mortar worked up stiff. The greatest care must be taken not only to fill up all the joints and beds with mortar, but all the interstices.

The work to be pointed in front with hydraulic cement mixed with an equal portion of sharp, clean sand, which must be well filled into all the joints, no more cement being prepared at a time than can be used immediately. Cope the wall with stone similar to the present coping on the wing wall of the bridge, joggle the stones together with hard stone, as shown on the drawings, and set them in cement.

Lengthen out the archway similar in size to the one already existing, constructing, in addition, a skewback arch underneath the whole length of the new portion of the arch, bedded upon well-rammed clay beaten on the surface to the true curve of the arch.

The skewback arch to be formed of fire brick laid in cement. The whole of the stones in the arch and the sides to be dressed straight and the surface picked, the whole being set in cement, as well as the stonework immediately above or around the same. The whole of the facework and walling for 2 feet in width round the arch, and the full thickness of the wall, to be set in cement. The whole of the works, before being rendered up as complete, to be made perfectly impervious to the sea water. Chase out a channel in the stonework of the

arch of sufficient size and depth to receive the frame of the flood door.

Remove the old flood door and frame at the end of the old archway.

The frame of the new flood gate to be constructed of oak 8 inches square, halved and pinned at the angles and wedged into the stonework in cement, the clear outside dimensions of the frame being 4 feet 6 inches wide and 5 feet 3 inches high.

Construct a flood gate, framed, grooved, and ledged, of 3-inch pitch pine, overlapping the inner edge of the frame at least $2\frac{1}{2}$ inches all round, and cross plank the inner face of the door *very* nearly to touch the frame with $1\frac{1}{2}$-inch red deal boards, planed true, and nailed to the outside framed planking through hooped iron, crossed diagonally, and forming squares on the planking about $4'' \times 4''$.

The gate to be suspended vertically to the frame upon two strong iron bands, formed of the best wrought iron, and weighing 8 lb. each, securely to the door with four inch wood screws and three $\frac{5}{8}$ square-headed bolts, with nuts and screws to each band, from a revolving bar of round $\frac{3}{4}$ wrought iron passing through strong wrought-iron eyes, passing through the frame of the gate, and fastened by nuts and screws on the inner side of the frame.

The gate and frame to be set with a slight inclination inwards from the sea, and to be eased so as truly to open and shut close up to the frame by its own adjustment and the pressure of the water.

The whole of the space from end to end of the bridge (about 2 feet wide) between the old and new walls to be filled with pure clay puddle, well punned down and consolidated, as the work proceeds, to 1 foot above the

height of extraordinary spring tides, marked by a blue line on the drawing.

Remove the upper portion of the old wall of the bridge to 10 inches below the surface of the present roadway level, and make the ballast and covering of the bridge solid and of uniform level up to the parapet wall of the new work.

The whole of the materials, workmanship, and labour to be provided by the contractor of the best quality of their respective kinds.

The whole of the work must be delivered up perfectly sound and completed, thoroughly water tight, and must be maintained in this state of efficiency, without extra charge, for the space of nine months after completion.

Payment to be made monthly at the rate of 70*l.* per cent., as the work proceeds, on the surveyor's measurement and valuation, who shall give the contractor a certificate each month, stating what he is entitled to receive; but if during any month any part of the work shall be found defective, or not carried up according to the drawings and specification, the surveyor shall have power to withhold such certificate until the month following, and until such defects have been properly and satisfactorily remedied.

The whole of the works to be completed in seven months from the date of the signing of the contract, and the contractor shall incur a fine of 1*l.* per day for every day that the completion of the works is delayed beyond the date specified. The amount of fine to be deducted out of the contract money kept in hand by the surveyor as and for liquidated damages.

The last instalment of 30*l.* per cent. shall be paid on the contractor producing a certificate from the surveyor, stating that the works are effectual and in all respects

satisfactory, in the first week of the tenth month succeeding the actual rendering up and completing of the works.

II.—*Specification for sundry Works to be executed in building a* STEAM-BOAT PIER *at for the* .

Abutment.—Carry up upon the present projection into the river the steps of granite, each of the full length in one piece, 15″ × 6″. Provide and fix a granite landing, 6 inches thick, and a granite slate in one piece to receive the ends of the bridge, feet wide, by inches in height, and work therein the necessary holes to receive the holding-down bolts, and run the same in with cement. All the exterior stone is to be fine hammer-dressed on the face; carry up the rest of the erection in brickwork in Portland cement. The bricks to be of the best hard grey stocks, of uniform colour on the face, and the cement to be mixed with three parts of clean, sharp river sand.

Supporting Piles.—Provide and drive the piles which are to support the bridge. They are to be of East Indian teak timber, of the length shown, and not less than inches square in any part.

Provide and fix the cap sills of or inches square, as shown, and mortise them on the tops of the pile.

Provide and fix the raking braces, struts, and timber ties as shown, and mortise them on the tops of the piles. Provide and fix the raking braces, struts, and timber as shown, also of . Provide and fix on each pile an iron strap, inches, by

inch, to tie the cap sills to the piles. Each strap is to be let flush on the top of the cap sill, and is to be carried inches down each side of the pile. Provide and fix at each pile inch bolts to hold the said straps, and also to pass through and hold the inch tie pieces on each side of the pile. Provide and fix to each raking brace, where they come in contact with the piles, inch screw bolts, to attach them to the piles, and where the raking braces cross, these bolts are to go quite through all. Above and below each strut provide and fix tie bolts inch diameter, passing through the piles from side to side. Where the heads or nuts are exposed to being struck by barges, they must be properly lined over with dolphins. Provide and drive the piles to form the dolphins, as shown.* Provide and fix the wrought-iron oval and segmental plates, as shown and as described in the specification for the dolphins at the pier at .

Provide and fix all the rubbing pieces, whether of wood or iron, as therein described, together with all bolts, nuts, and ironwork required, and as shown on the Drawings Nos. and . Provide and fix to each of the piles, whether in the dolphin or supporting the bridge, a wrought-iron shoe of not less weight than lbs. weight.

At the upper or dolphin sheet piling is to be prepared and driven, and concrete put in, as described in the specification for the dolphins at . The same provisions as are made in that specification with respect to the pile caps, bolts, dressing and painting, and liability of the contractor in cases of accident, are to apply to the work referred to in this specification.

It is intended that the piles, braces, &c., provided for the dolphins at pier should be of the best

* Plate 8, Figures 11 and 12.

timber, of the lengths and dimensions shown on Drawing No. 1, the sheet piling round the dolphins to be as specified for the pier.

PLATER'S AND SMITH'S WORK.

The drawings referred to for this work are numbered.

The wrought-iron incline bridge is to be executed in the manner and of the various scantlings and dimensions described in the Drawing No. .

All the iron is to be of best quality, all the joints of the angle irons in the top and bottom webs are to be properly broken, and where they occur the joint is to be doubled with a piece of flat iron of the same width and thickness as the adjoining feather of the angle iron, and extending from one to the other of the adjoining struts, and to be properly riveted.

The floor is to be formed of deck deal plane, jointed and laid close, and is to be well nailed to the firring-out pieces, which are to be inserted in the transverse angle irons or joints; these firring-out pieces are to be of oak, and are to be fixed to each of the transverse angle irons with bolts. Tread strips of oak are to be nailed across the floor, at distances not more than feet asunder. Diagonal struts of oak are also to be provided, put together and fixed as shown.

At each end of the bridge provide and fix, by riveting them as shown, wrought-iron eyes, for the purpose of attaching the incline bridge to the smaller pontoon at one end, and to the bridge at the other. The iron for these eyes must be of the very best quality.

Build oval and segmental plates with angles and plate iron, as shown in the Drawing No. . Punch the holes, as shown, in the top and bottom angle

irons, for the purpose of receiving the bolts to attach the plates to the dolphins.

The quality of the iron, and the mode of executing the plater's and riveter's work embraced in the above works, are to be similar to that described for the lattice girder bridge; erect and complete the bridge, as shown in the Drawings Nos. 1 and 2.

Provide all labour, scaffolding, staging, and everything necessary for erecting and completing the same. All the iron is to be of best quality, all joints are to be properly doubled and broken, as shown. The riveting throughout is to be carefully performed; in all cases where the holes in the different pieces, after they have been punched, do not come together exactly true, they are to be rimed out. The rivets are to be button heads, and the points are to be neatly stopped; all the plating is to be accurately and neatly executed, the butts and side joints are to fit closely together.

At each of the supporting piers of piles the girders are to rest on blocks of cast-iron, extending from joist to joist, thick; where each of these blocks will come, a plate inch thick is to be riveted to the bottom angle irons of the girder, and holding down bolts are to be provided and fixed, to take the inch plate, the cast iron to blocks, and the cap sills.

Provide and fix buckled plates for the floor, as shown, and bring it up to a level with Portland cement concrete, formed with parts of clean, sharp sand, and part of cement; cover the whole floor with , gritted with in thickness.

The holes for the holding down bolts are to be made so as to allow for the contraction and expansion of the girder bridge.

IRON SHIP BUILDER'S WORK.

The larger dummy or pontoon is to be constructed in accordance with the Drawing No. for the pier at , excepting that the framing and steps at each end provided for therein are to be omitted in this case, and the deck is to be carried over the space occupied by the said framing and steps.

The deck and outwall are to be of timber thoroughly seasoned and dry. No deck plank is to exceed inches in width, the guide pieces to work up and down; the dolphin piles are to be of oak or deck timber, they are to be fitted loosely into the iron framing prepared to receive them, as shown, and are to be held in their places by wedges . Gratings are to be provided and fitted in the deck , oak bollards are to be provided as shown.

The plate which covers the outfall is to be held on with bolt screwed up on the inside, with proper washers against the side of the pontoon. There are to be bolts in each feet in length of the wall. The holes to receive the heads of the bolts are to be countersunk, and the heads are to be flush with the face of the plate. Proper holes are to be formed in the frames of each pontoon.

The smaller pontoon is to be constructed in accordance with Drawing No. 4, and the general dimensions and scheme of scantlings, both as regards the vessel itself, and the framing and steps to receive the iron bridge, the sleepers, as well as the said framing and steps, are to be of oak or teak timber. The links to connect the two pontoons together are to be constructed and fixed as shown, and are to be made of

the best scrap iron; the plating is to be single riveted. The strips over the butts are to be the thickness of the plates they cover; the outside riveting is to be countersunk and flush, the inside to be snapped or cheese headed.

All the ironwork is to be painted coats red lead, the woodwork coats finished stone colour, the outside of the pontoons is to be finished with black varnish.

The plates are to be best boot plates, and all other iron of the best quality.

GENERAL CONDITIONS.

The whole of the works are to be done to the entire satisfaction of the engineer, to the of the , and the contractor is to find, provide, fix, and perform, with the best materials of their general kinds, all and every part of the works which are specified, represented, intended or implied, either particularly or generally, in this specification, and in the drawings herein referred to, and such other drawings as may be given at large by the said engineer, and according to such written or verbal instruction as he may give during the progress of the works; and should any works be described in this specification, which are not, or could not be, represented in the drawings, or should any works be represented in or be reasonably implied in the drawings, which are not mentioned in the specification, or described therein, the several works are in either case to be done, and nothing is to be omitted which is required to render every portion of the works completely finished and fit for the purposes required (as all works which are so requisite are to be considered) as included in the contract, unless a specific agreement at the option of the should be at any time made in

writing, to allow the a greater or less sum of money on account of any deviation from lessening or addition to the quantity or quality of the several works.

It is distinctly understood that the decision of the engineer of the on all points connected with these works, is to be final and decisive between the said and the said .

No variation in the execution of the works described, either as regards additions or deductions, is to annul the contract, but such additions or deductions are to be valued according to the scale of prices to be attached to the tender.

The whole of the works described in the accompanying specifications are to be completed in the space of calendar months from the date of the order being given to commence them, and the contractor will be held liable to a penalty of *l.* per day for each day the several works or any of them shall remain unfinished beyond the said months, the amount of such penalty to be deducted from any sum which may be due to the contractor on account of his contract.

The tender is to state in one sum the amount for which the party tendering is willing to execute the works described in the accompanying specifications and drawings.

The person whose tender may be accepted is, if required, to enter into a bond with two eligible sureties, jointly and separately, to be bound under a penalty of *l.* for the due performance of this contract.

The do not bind themselves to accept the lowest or any tender.

Tenders sealed up and marked on the outside: "Tender for Steam-boat Pier ," to be delivered at the office of

not later than the day of instant.

Scale of Prices referred to in the Specification.

	£ s. d.
Fir timber in main piles . .	per foot cube.
oak timber . . .	,,
teak timber . . .	,,
elm timber . . .	,,
Wrought iron inch screw bolts, nuts, and plates . . .	per cwt.
Do. pile shoes	,,
Carpenter	per day.
Pile driver	,,
Labourer	,,
Boat slates	per ton.
Best iron	,,
Rivets	per cwt.
Plater	per day.
Riveter	,,

III.—*Specification for* Retaining Wall.

EXCAVATOR.

The excavations will be made by the workmen, the drain pipes will be provided, and the broken stone at the back provided and thrown in.

MASON.

The contractor to provide all labour attending the construction of the wall, all mortar, bricks, cement, and all tackle and implements necessary for carrying out the work ; will provide the sand for the mortar, and the stone for building the wall, but the contractor must convey them from the places on the , where they are left by workmen,

to the places where it is necessary to make use of them .

The mortar used for the wall to be that made with one-third by measure of Dorking lime, and two-thirds clean sharp sand from , the whole being thoroughly mixed and incorporated.*

The wall to be built in random course, with the stones laid flat and perpendicular to the face line of the wall, and so as to make as smooth and fair a face on the outside as possible, the stone being broken or selected so as to attain this object, the whole of the joints throughout to be well filled in, and flushed up with mortar made as stiff as it can be for convenient use.

The larger and longer stones to be selected, and used as through stones, laid endways, so as to go through the whole thickness of the wall, for the purpose of binding the same as thoroughly together as possible.

The wall to be coped with good hard-burnt (blue or purple) bricks, laid on edge and endways to the front, the bricks to be laid and set in Portland cement, mixed with an equal quantity of sand; no more cement to be made at a time than can be immediately made use of.

The work to be completed and delivered up to within weeks from the day of date of the signing of the agreement .

Payments will be made by measurement when required to the amount of *l.* per cent. of the work actually executed and finished, and the balance will be paid at the expiration of weeks from the date of completion, on a written certificate being given by the surveyor for that he is satisfied with the manner in which the work has been executed, but if any defect or bad workmanship should appear, then the contractor must make good the same to the satisfaction of

* Figure 13, Plate 8.

the surveyor before the said payment of the balance of *l.* per cent. be made to the contractor, and the contractor must make good any defect or bad workmanship at his own proper cost and charge. In all cases of dispute, the decision of the surveyor to be final and binding on all the parties.

As regards thickness, height, and batter, the walls to be carried up according to the plans and sections which accompany this specification, signed by the surveyor.

This contract was completed for 6s. per cubic yard, stone only being found and carted to the spot; the 5-inch brick coping on edge was 5d. per foot run extra.

IV.—*General Specification for Engineering Work.*

FORM OF TENDER.

GENTLEMEN,

hereby offer to execute the whole of the Works comprised in your Specification, dated . for . in accordance with the terms thereof, for the sum of . and hereby nominate . of as Arbitrator on behalf, and offer the names of . of and of for your approval as Sureties for the due performance of the Contract.

also submit the following Schedule of prices for Materials and Works, as specified to be annexed to the Contract as provided in the Specification.

also undertake to execute the Contract Deed

and other documents appertaining thereto at your request.

Gentlemen,

Yours respectfully,

To the .

CONDITIONS OF CONTRACT.

All the works, although parts of the same may be marked on the plans or sections only, are to be considered as part of the contract, and the value included in the amount stated in the contract, as much as if such works had been particularly set forth and described in the specification also; and such of the works as may be mentioned in the specification only, without being drawn on the plans or sections, are to be included in the contract sum, as if they had been particularly drawn on the plans and sections also; and as there may be details not particularly mentioned in the specification nor drawn in the plans or sections, the contract sum is also to include all such details as may have thus been omitted, it being clearly understood that the contractor is to execute all the works requisite for the perfect completion of each and every of the several parts according to the true intent and meaning of the specification.

Wherever the dimensions are marked on the plans or sections, or described in the specification, such dimensions are to be considered as correct, although not exactly corresponding with the measurements from the scales, which are to be referred to only when the dimensions are not so marked or described; and the drawings to larger scales, and those showing particular parts of the work, are to be taken as more correct than those to smaller scales or for more general purposes. The con-

tractor is, without any extra charge, to execute the several parts of the work in strict compliance with the working or detailed drawings that may from time to time be furnished, provided they be such as not to vary from the true intent and meaning of the contract.

In case of alterations in the work or deviations from the drawings being deemed necessary by the surveyor, the may increase or diminish the work without vitiating the contract; the value of all such increases or diminutions being ascertained from the rates and prices stated in the schedule annexed to the contract, and added to or deducted from the contract sum as the case may be.

No extra work of any kind or description whatever will be paid for by the unless it has been executed under a written order signed by the surveyor, and a weekly bill of all such work or such parts thereof as may be executed must be delivered by the contractor to the surveyor, at the during the following week; and the non-delivery of such bill at the proper and stated time will be considered as an abandonment on the part of the contractor of any claim for the amount of such work, and as exonerating the from all liability relative thereto, and the value of all such extra work shall be ascertained according to the rates and prices to be stated in the schedule annexed to the contract.

All measurements are to be the net dimensions of the work when finished, notwithstanding any custom that may prevail to the contrary; and in measuring stone work the largest finished dimensions are to be taken each way, and the net area of the beds and joints is to be measured. All lead and small iron work is to be weighed on the ground by the contractor, in the presence of the surveyor or clerk of the works, pre-

viously to its being fixed, scales being provided by the contractor for the purpose.

The whole of the works, both as regards quality of materials and mode of execution, are to be performed and completed in the most approved, workmanlike, and substantial manner, under the direction and to the entire satisfaction of the surveyor. Wherever any materials are specified to be mixed in certain proportions, proper measures are to be provided by the contractor for the purpose, as no guess work will on any account be permitted.

The surveyor and the clerk of the works are to have full power and liberty to inspect the materials and manufacture of the various parts of the works at all times during their progress; and in case of the contractor's refusal to allow such inspection, the work is to be deemed insufficient and not in accordance with the terms of the specification.

The contractor is not to use the land forming the site of or connected with the works for any other purpose whatsoever than the proper carrying on of the works.

The contractor shall from time to time remove all surplus and objectionable materials, waste, or rubbish, from the works, and from any land or premises where any portion of the work may be carried on.

The contractor is to employ, at his own cost and charge, a competent foreman constantly at the work, to ensure efficient control and superintendence; and no person is to be employed or allowed to remain on the work, or any part thereof, who shall be objectionable to the surveyor.

The contractor shall attend to and execute without delay all orders and directions which may from time to time be given by the surveyor or the clerk of

the works, in connexion with the contract; and in case of his refusing to comply with all such orders and directions, or of his not proceeding with all due diligence and expedition within twenty-four hours after a written notice requiring the same has been delivered to him or his foreman, as hereinafter provided, the surveyor shall be at liberty to use, free of cost and charge for wear and tear, all or any of the contractor's tools, implements, and materials, which may be on the work or in use at the time, and also to employ other men, provide all necessary tools, implements, and materials to perform such works as he shall require and direct, agreeably with the specification; and the contractor shall repay to the all the costs, charges, and expenses to be thereby incurred, or the same may be deducted from any amount that may be due to the contractor, and retained by the in reimbursement of all such costs, charges, and expenses.

If at any time during the progress of the works, or within twelve calendar months after their completion, any imperfections or insufficient workmanship shall appear, the contractor is forthwith to make good the same at his own expense; the true intent and meaning of the specification being, that the whole of the works are to be delivered up to the properly and completely finished and perfect in all their parts, and in conformity in every respect with the contract.

The contractor is to take upon himself the risk of, and be answerable for all accidents and damages, consequential or otherwise, that may occur during the progress and until the entire completion of the works, and to repair and make good the same from time to time as soon as possible, at his own cost and charge, and bear the entirely harmless therefrom.

The drawings referred to in the specification are to be

signed by the contractor, and to remain in the custody of the surveyor during the progress of the works, the contractor being allowed access to them at all reasonable times, for the purpose of taking copies of the whole or any portion of them he may require.

All notices to the contractor are to be given in writing, and the delivery of them to his foreman, or at any of the contractor's usual places of business or residence, is to be deemed sufficient service.

The entire work is to be warranted by the contractor, and completed within calendar months from the date of the written order to proceed with the work, under a forfeiture of per week, to be paid to and retained by the , by way of liquidated and ascertained damages, and not by way of penalty, for each and every week the work shall remain unfinished after the expiration of the period above mentioned.

The works are not to be deemed finished or complete until they shall have been certified to be so in writing by the surveyor.

The surveyor may delay the progress of the works in case of frost, or from any other cause, without vitiating the contract, and grant such extension of the time for the completion of the contract as he may think proper and sufficient in consequence of such delay, and the contractor shall not make any claim for compensation or damage in relation thereto.

If at any time during the progress or after the completion of the works any disputes or differences shall arise as to the manner of executing the works, or as to the quality of the materials employed, or as to any matter of charge or account between the and the contractor, or as to any other matter or thing connected with the contract, they are to be referred to

and finally settled by the surveyor, whose decision shall be final and conclusive on both parties.

Payments will be made upon the recommendation of the surveyor only, the first of such payments whenever he may consider that 50 per cent. of the works contracted for have been executed, and the subsequent payments from time to time when it shall appear to him that the works contracted for have been executed. All such payments will be at the rate of 80 per cent. of the works so considered to have been executed, whether contract or extra works, the balance due will be paid at the expiration of three months after the completion of the works, and the payment for the whole of both contract and extra works will be subject to a deduction or discount of 1*l.* 10s. per cent.

The contractor will be required to provide two sureties, to be approved by the , and such sureties will be required to enter with the contractor, jointly and severally, into a bond in the penal sum of 100*l.* for the due performance of the contract.

Tenders for executing the whole of the works comprised in the specification, to be addressed to , on or before .

The do not bind themselves to accept the lowest or any tender.

Specification of Excavator's Work *required to be executed for the ,*
in the construction of
in accordance with the accompanying drawings, numbered 1 *to inclusive.*

The contractor is to provide all labour, tools, implements, materials, shoring, carriage, and other things requisite to execute the following works, namely :

To excavate the ground for the cellars, areas, foundations, trenches and inverts, to the depths, dimensions, and forms shown on the drawings, and to keep them dry and clear of all obstructions whether arising from springs, drains, cesspools, rain or otherwise, and to keep the work dry and clear as long as shall be thought necessary by the surveyor: to excavate all loose or unsound places that may be caused during the execution of the works to a level bed and step them into the banks where directed, and to fill in the same as hereinafter provided at his own cost and charge.

To fill in where required with suitable dry, hard material, small and well rammed in regular and level courses, not exceeding 6 inches each course in thickness; the work to be proceeded with from time to time as will be directed. No clay is to be used for a width of 5 feet at the back of any wall, but cinders, gravel, broken stone, old bricks, or other material that will allow the free percolation of water.

To excavate and form the ground beneath the ground and cellar floors, and areas, for a depth of 6 inches, and to fill in the same with dry lime rubbish or sand, properly rammed solid, and prepared to receive flagging or other flooring.

To provide and lay all glazed and socketed draining tubes in the several directions, and of the capacities figured and shown on the drawings; they are to be laid solid, fitted together, packed and puddled at the joints; the dimensions marked on the drawings are the inside measures; all trenches are to be open cut, and the drains are to be laid to a fall of not less than one inch to the yard. All branch pipes are to have a bend at their junction with the main or other sewer. To fix for all down pipes from the roof, soil and other pipes, surface and ash-pit girds, proper trapped eye pieces of the sizes required for the several drains. To fix all

junctions required, and bends wherever directed to ensure the more easy flow of the water through the several drains.

To fill in concrete where required, composed of one part of fresh burnt Ardwick lime measured before slaking, and six parts of clean sharp gravel or hard stone, broken in pieces of not more than 2 cubic inches each, with such a proportion of sand as shall be approved by the surveyor; the lime is to be slaked and fallen in layers with the gravel, and then mixed together with a sufficient quantity of water; it is then to be laid in its place in regular and level courses not exceeding 6 inches each course in thickness, and well rammed.

The contractor is not to remove any timber that may be in use as shoring, piling or otherwise, until directed to do so by surveyor or clerk of the works, and he is to leave permanently in the work any such timber that may be ordered by the surveyor, any timber so left is to be paid for as extra work.

The contractor is to provide a place of deposit for all surplus earth or rubbish that may be removed from the site of the works.

In charging for day-work, the actual time engaged on the work only is to be taken.

Specification of BRICKLAYER'S WORK *required to be executed for the , in the construction of , in accordance with the accompanying drawings, numbered* 1 *to inclusive.**

The contractor is to provide all labour, tools, implements, materials, scaffolding, shoring, carriage, and

* Figs. 14 and 15, Plate; 8 and Plates 9 and 10.;

other things requisite to execute the whole of the works, to the forms and dimensions shown on the drawings.

The bricks are to be the best hard, square, and well burnt that can be obtained in the neighbourhood of , without reference to the cost of carting, the quality to be approved by the surveyor; they are to be as free from limestone as possible; nothing of less size than half a brick is to be used in the work, and in cases where less than a whole brick is used, it is to be made square before being set, so as to receive the regular thickness of mortar up to the adjoining brick.

All the bricks are to be totally immersed and well saturated with water in a tub to be provided for the purpose, in which they are to be allowed to remain for such time as the surveyor shall direct, but in no case less than half an hour. Water being thrown on the bricks in a heap will not be deemed sufficient for the purpose.

The mortar is to be composed of one part of lime measured before slaking, and two parts of sand. The mortar for all work below the surface of the ground, and for retaining walls, is to be made with Ardwick lime; for the face of retaining walls where exposed to the air, for a thickness of 9 inches, and for all walls above the surface of the ground, and where there is no ground laid against them, it is to be made of Buxton lime.

The lime for the mortar is to be brought direct from the kiln, fresh and well burnt, in such quantities as may from time to time be directed by the surveyor.

The sand for the mortar is to be the best, clean, sharp, ground or pit sand that can be procured within a radius of four miles from the work.

After the Ardwick lime has been slaked and properly fallen, it is to be mixed with the proper quantity of

sand, and both together are to be passed through a screen; it is then to be worked in a mortar mill with a sufficient quantity of water and ground for such time as may appear necessary to the surveyor, to insure the lime and sand being properly incorporated, and of a sufficiently tough consistency. The lime is to be slaked in a pit and then mixed with the proper quantity of sand, and worked in a mortar mill as described for Ardwick lime.

The mortar is to be used from the mill as quickly as possible, and none that has been allowed to set is to be re-worked—but it is to be at once rejected. Care is to be taken to use all the mortar that has been mixed at the close of each day.

The cement is to be obtained from a maker to be approved by the surveyor direct from the manufactory, perfectly fresh, and delivered on the work in the casks in such quantities only as will from time to time be directed by the surveyor, the cost of the cement to be 16s. net per cask of three cwt., and if it is obtained at a less price, a corresponding deduction will be made from the contract.

The cement is to be gauged in small quantities as required, with an equal quantity of sand, for which purpose proper gauging boxes are to be provided.

No cement that has been allowed to set or become dead is to be re-worked, but is to be at once rejected. The cement is to be used in the work in a precisely similar manner to that described for the mortar work.

The brickwork in every case is to be of old English bond, care being taken to cross all the joints; all the heading courses are to be of whole bricks.

Where seconds bricks are specified to be used for the face work, they must be of uniform colour and of the same thickness as the common bricks used with them;

where common bricks only are to be used, they are to be carefully selected of good shape for the purpose. No colouring matter is in any case to be applied to the face of the work.

The face work is to be finished with a neat flat or flush joint, tucked or cut on the upper edge with the trowel at the time the bricks are set. The joints are to be as thin as possible; from a quarter to three-eighths of an inch only will be allowed, according to the description of work. All gauged arches to be dressed off in putty.

Every brick is to be flushed through with mortar or cement and hammered down to a solid bed as it is laid, both headers and stretchers, so that every joint may be filled. No filling up of the joints from the tops of the courses will be permitted.

Where the walls are more than 14 inches in thickness, the filling-in bricks are to be laid in soft mortar or cement prepared for the purpose, every brick being rubbed up solid and hammered down to its bed; a tub or pug mill is to be provided for the mixing of the soft mortar which is to be supplied from the mortar mill, it is to be kept well stirred up, so as to prevent the sand from depositing at the bottom of the tub.

In all retaining walls, drains $4\frac{1}{2}$ inches by 3 inches are to be formed through the wall at regular intervals, 6 inches above the level of the ground on the lower side; they are to be not more than 10 feet apart, are to be rendered throughout with cement, and are to be formed with a regular fall to the face of the wall so as to allow of the free egress of water from the back of the wall; they are to be finished with a cast-iron grid flush with the face to the wall.

The whole of the work is to be carried up together as much as possible of an uniform height, and in no case

is there to be a greater difference in the levels of any parts of the same building than 4 feet 6 inches, without the special permission of the surveyor.

Every precaution is to be taken to protect the work from the weather, that may be directed by the surveyor; and any work that may be injured by frost or otherwise is to be made good by the contractor.

In the case of old bricks being procured on the premises, they are to become the property of the contractor, who is to be allowed to use such portions only as shall be approved by the surveyor, and these are to be properly dressed, cleaned, and stacked for re-use.

All smoke flues are to be not less than 14 inches by 9 inches, measured at right angles with the flue in any part thereof. And all smoke and air flues in the walls are to be pargeted throughout with good hair mortar, and left clean and clear of all obstructions on the completion of the roof; the top six courses of all flues are to be set in cement.

Every flue is to be surmounted by a terra cotta pot, set in cement, of the net value of 5s. before fixing; they are to be purchased at such depôt and to be of such pattern as may be selected by the surveyor.

Over all fireplace openings, wrought-iron arch bars 3 inches by $\frac{3}{8}$ inch are to be fixed; they are to be laid $4\frac{1}{2}$ inches on each jamb, and to turn up at each end $4\frac{1}{2}$ inches.

Over all openings under 5 feet span, relieving arches of two $4\frac{1}{2}$-inch rims, and over all openings of 5 feet span and above, relieving arches of three $4\frac{1}{2}$-inch rims are to be built.

All timbers are to be built in the walls where directed, but no timbers are to be built in the walls nearer than 5 inches to any flue or vent.

For all hearths in timber floors 4½-inch common brick arches are to be built the whole length between the trimmer joists.

The contractor is to set all fire grates, ranges, furnaces, and boilers with a sufficient quantity of fire bricks and fire clay.

The contractor is to execute all brickwork required in connexion with the sewers and drains, and to build all eyes that may be required for the grids and dish stones of brick-length walling, 9 inches square in the inside.

All slopstones and stone or slate shelves are to be set upon seconds brick pillars, 9 inches thick, with bull-nose angles.

The contractor is to make all centring, templets, profiles, battering rules, and camber slips that may be required, of such strength and in such manner as shall be directed by the surveyor.

To form all string and saw-tooth courses where shown on the drawings, to set all steps not specified to have stone risers, to form all projections, splays, bevils, indents, recesses, chases for pipes and skewbacks; to level the walls for, and to bed thereon, all bond timber, wood bricks, templets, wall plates, nogs, and all other timbers required to be built in the walls; to bed and set all window and door frames, also all stone heads, sills, gudgeon, codge, and catch stones; to cut all holes when and as required for the fixing of other branches of the work, and to make good after the same. To make good all putlog and other holes throughout the work, and to point the same; to fill in between the rafters up to the slating; and generally to do whatsoever may be considered by the surveyor to be incidental to the bricklayers' work when and as required.

The contractor is to excavate where required, for the purpose of measuring foundations of walls or otherwise,

and to fill in and make good the same at his own expense. In measuring arches and inverts, the price in the schedule is to include all skewbacks and other cutting connected with them.

In charging for day-work, the actual time engaged on the work only is to be taken.

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*Specification of Ironwork required in the . , and the Works connected therewith, in accordance with the accompanying drawings, numbered 1 to 6 inclusive.**

The contractor to provide the whole of the labour, tools, tackle, legs, scaffolding, and all other things requisite; to provide, fix, deliver, paint, and completely finish all the cast ironwork to the forms and dimensions, and in the positions shown on the drawings.

In addition, to provide and fix the three large main girders and other girders for carrying the plates and cross girders, and one hundred and eight small cross girders, and also the plates between, of the several forms, sizes, and dimensions shown and figured on the drawings.

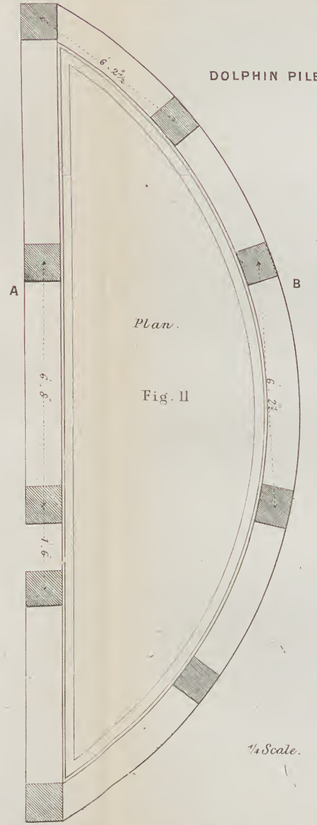
The contractor, at his own expense, to test the several girders on the ground, in the presence of the surveyor, to a pressure of 20 tons applied in the centre, and if the deflection exceed $\frac{5}{8}$ of an inch, or if it produces permanent set, the girder is to be rejected.

The girders are to be bedded on the stone with neat Portland cement, used quite fresh; all the spaces between the plates and girders to be filled with iron cement, so as to render the tunnel perfectly drop dry.

None of the main girders are to weigh less than the

* Figs. 14 and 15, Plate 8; and Plates 9 and 10.

DOLPHIN PILE.



Plan.

Fig. 11

¼ Scale.

Section on A.B. on Plan.

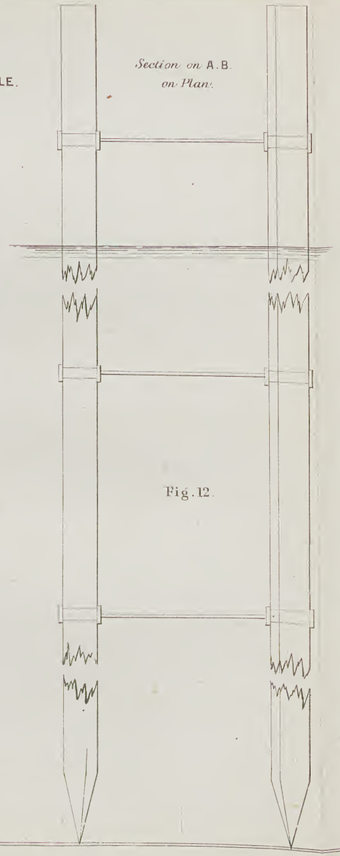


Fig. 12.

Fig. 13

SECTION OF WALL.

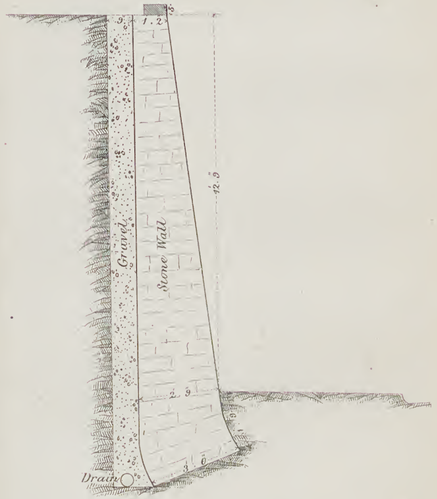
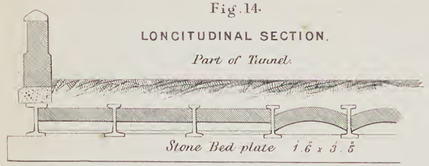


Fig. 14.

LONGITUDINAL SECTION.

Part of Tunnel.



Brickwork

Water line

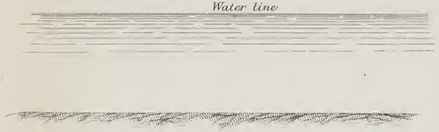


Fig. 9.

ENTRANCE GATES.

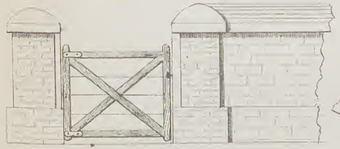


Fig. 10.

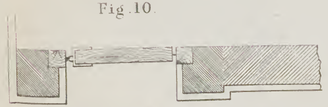
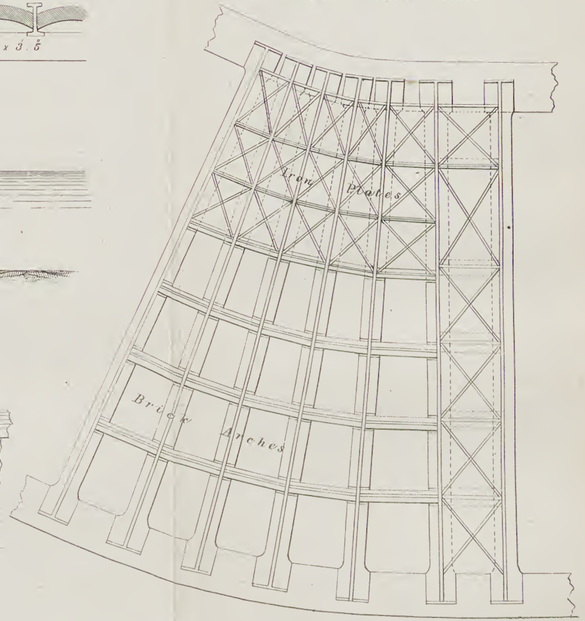


Fig. 15

TUNNEL

Fan Girdering and Plate work where Brick Arches are not used



SCALE OF FEET



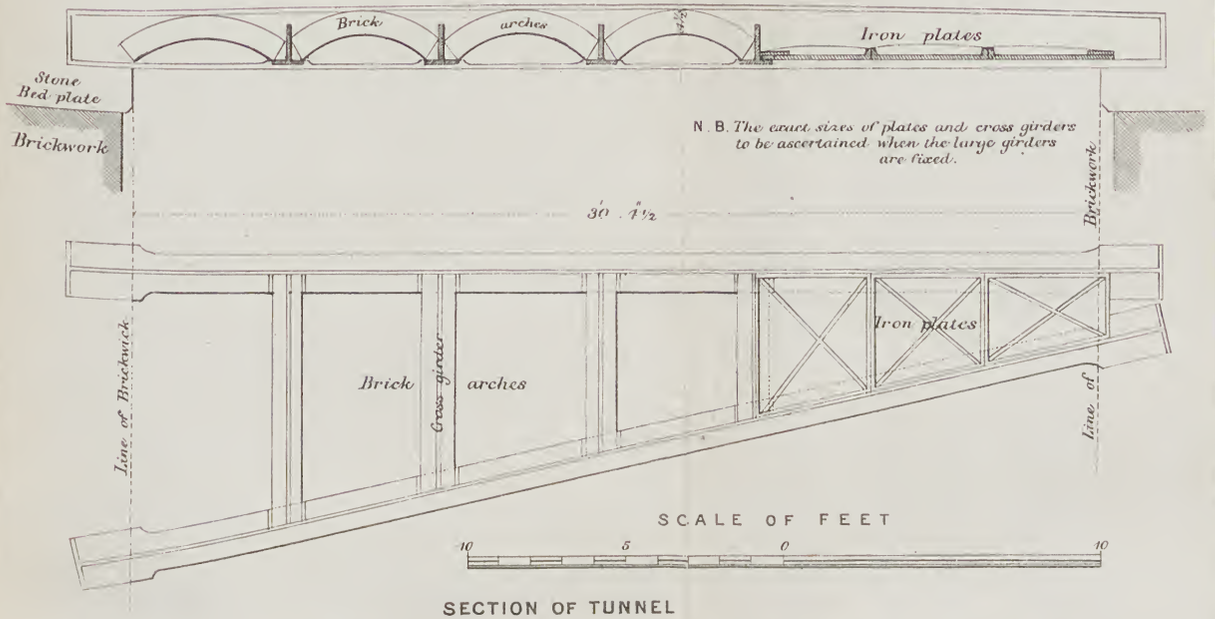
Woodcot & Alexander, Lith.
45, Castle Street, Holborn.

E. & F. N. Spon, 16, Bucklersbury, London.

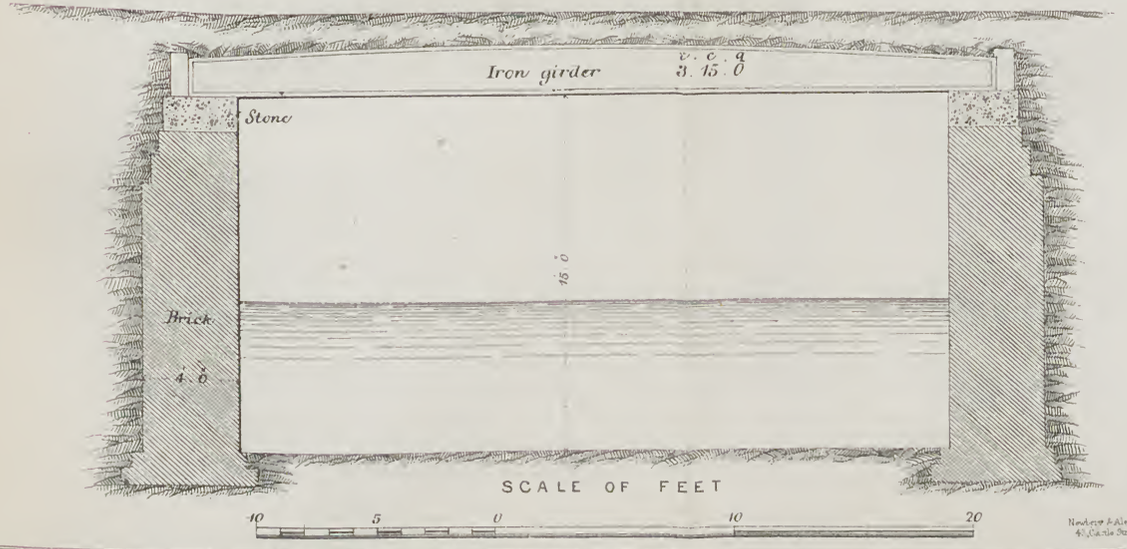
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DETAILS OF IRON WORK.

Fig. 16



SECTION OF TUNNEL



F. E. & N. Spon 16. Bucklersbury, London.

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DETAILS.

Fig. 18

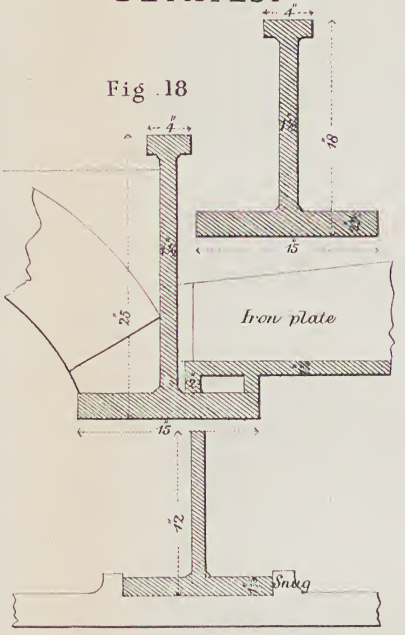
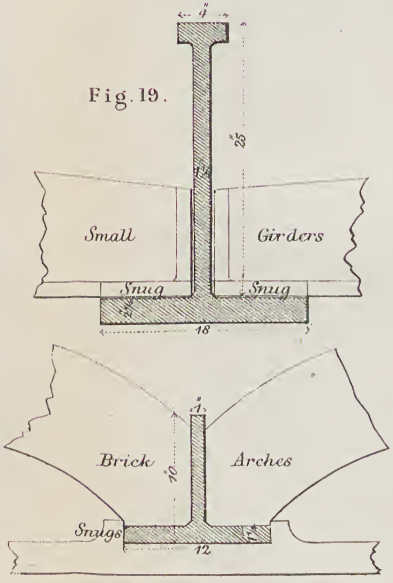


Fig. 19.



Newberry & Alexander, Lith.
43, Castle Street, Holborn

E & F. N. Spon. 16, Bucklersbury, London.

VICTORIAN RAILWAYS
GENERAL LIBRARY

respective weights marked on the drawings, and no extra charge will be allowed for any excess of weight. Each girder is to be cast with a bar 1 inch square and 3 feet 6 inches long, cast on it for the purpose of testing its breaking weight, which is not to be less than $7\frac{1}{2}$ cwt. in its centre, between bearings 3 feet apart.

The contractor is to test one of the girders in his own yard that may be selected by the surveyor, in the manner to be approved by him, to the breaking weight, which is not to be less than 75 tons in the centre.

The contractor is to state in his tender the proportions and quantities of scrap and other iron which he proposes to use in the work.

In charging day work, the actual time engaged will only be allowed for.

The castings are to be composed of a mixture of $\frac{1}{4}$ part of scrap iron and the remainder of such a mixture as shall be approved by the surveyor, the whole of the ironwork coated while hot with boiled linseed oil, and, after the work is fixed, to be covered with one coat of lamp black and boiled linseed oil mixed with a sufficient quantity of japanners' gold size.

All the ironwork exposed to the air to be painted, when the work is completed, with four coats of best oil paint.

All the castings to be perfectly true and out of winding, clean, and free from sand or air holes, or any flaw or imperfection whatever, and the net weight of each casting is to be plainly painted on it.

When the large girders have been fixed in their respective places, the exact size of the cross girders and plates are to be ascertained, and then made and fixed.

Schedule of Prices for Excavator's Work, as specified, referred to in the conditions of Contract.

Excavating, filling in such portion as may be required, and removing surplus earth, for any depth not exceeding 6 feet, at per cubic yard.

Do. for any depth from 6 to 12 feet, at per cubic yard.
Do. do. 12 to 18 do. do.
Do. do. 18 to 24 do. do.
Do. do. 24 to 30 do. do.

Excavating and depositing on the surface where the depth does not exceed 6 feet, at per cubic yard.

Do. where the depth does not exceed 12 feet, at per cubic yard.
Do. do. 18 do. do.
Do. do. 24 do. do.
Do. do. 30 do. do.

Wheeling extra per stage of 20 lineal yards, at per cubic yard.
Filling in, at per cubic yard.
Removing and carting away surplus earth or rubbish, at per cubic yard.
Cinders delivered on the work, at per cubic yard.
Forming and levelling cinders on surface extra, at per superficial yard.
Concrete, at per cubic yard.
Clay puddle, at per cubic yard.
Socketed, glazed, oval earthenware pipes, 8 in. by 6 in., laid complete, at per lineal yard.
Do. do. do. 12 in. by 9 in. do.
Do. do. do. 16 in. by 12 in. do.
Socketed, glazed, circular earthenware pipes, 6 in. diameter, laid complete, at per lineal yard.
Do. do. do. 9 in. do. do.
Do. do. do. 12 in. do. do.
Do. do. do. 15 in. do. do.
Do. do. do. 18 in. do. do.
New timber shoring or piling, left in the work, at per cubic foot.
Old do. do. do. at do.
Use and waste of timber in piles, at per cubic foot.
Do. do. in shoring, at do.
Wrought iron in spikes and nails, at per lb.
Do. in straps and bolts, at do.
Cart, horse, and man, at per hour.
For each horse extra add do.
Carpenter, at per hour.
Excavator, at do.
Labourer, at do.

Schedule of Prices for Carpenter's and Joiner's Work, as specified, referred to in the conditions of Contract.

Rough timber delivered on the ground.

Memel or Dantzic fir, at per cubic foot.
Quebec pine, at do.
If fixed in shoring, add for use and waste per cubic foot.

In scantlings delivered on the ground.

Memel or Dantzic fir, at per cubic foot.
St. John's pine, at do.
Quebec pine, at do.
Pitch pine, at do.

Rough scantlings fixed complete.

Memel or Dantzic fir, in bond plates, pole plates, wall plates, curbs, lintels, wood bricks, &c., at per cubic foot.

Scantlings—framed rough.

Memel or Dantzic fir, at per cubic foot.
St. John's pine, at do.
Quebec pine, at do.

Flooring boards 1 inch thick, laid complete.

Archangel battens, at per superficial yard.
Pitch pine, at do.
Red pine, at do.

Boards without labour at per superficial foot.

Thickness.	Memel or Dantzic.	Pitch Pine.	St. John's Pine.	Red Pine.	Spruce.	American Oak.	Dantzic Oak.	Baywood under 18 in. wide.
$\frac{1}{2}$ Inch .								
$\frac{3}{4}$ Inch .								
1 Inch .								
$1\frac{1}{4}$ Inch .								
$1\frac{1}{2}$ Inch .								
$1\frac{3}{4}$ Inch .								
2 Inches								

In this case only allowance will be made for the saw-cut, but in every other the dimensions specified are the net finished dimensions of the work when fixed, as provided in the conditions of contract.

Labour.

Carpenter, at per hour.
Joiner, at do.
Labourer, at do.
Cart, horse, and man, at per hour.
For each additional horse, at do.

The contractor whose tender may be accepted is to be at liberty, before signing his contract, to add to this schedule the prices for other work contained in the bill of quantities upon which his tender was based; and in default of his doing so, any prices that may be required in making out the account between the and the contractor, are to be fixed by the surveyor, as provided in the conditions of contract.

Schedule of Prices for Bricklayer's Work, as specified, referred to in the conditions of Contract.

Brickwork in mortar.

Of common bricks in walls more than two bricks in thickness at per cubic yard.
Two bricks thick and under at per superficial yard of one brick in thickness.
If more than 30 feet above the ground add per superficial yard of one brick in thickness.
If more than 50 feet above the ground add do.
If circular on plan add per yard superficial of face work.
If seconds bricks are used for the face work add to the price for common bricks per superficial yard.
If stock bricks are used for the face work add to the price for common bricks per superficial yard.
Cutting and rubbing plain bevils for face work at per superficial foot.
Rough cutting at per superficial foot.
Bull's nose seconds bricks at per lineal yard.
Weathered-end seconds bricks for set-offs at per lineal yard.
Add for extra labour in arches in common bricks at per superficial yard of soffit for each rim in half brick rims.
If in seconds bricks at do.
If in purpose made radiating common bricks at do.
If in purpose made radiating seconds bricks at do.

Inverts in half brick rims in common bricks at per superficial yard inside measure for each rim.
If in seconds bricks at do.
If in purpose made radiating common bricks at do.
If in purpose made radiating seconds bricks at do.
Add for extra labour in gauged arches in stock bricks at per superficial foot.
Wrought-iron arch bars at per lineal foot.
Hoop iron, No. 14 gauge, built in walls at per cwt.

Brickwork in cement.

If substituted for Ardwick lime add to the foregoing prices at the rate of per superficial yard of 9 in. work.
If substituted for Buxton lime add do.

Materials only, delivered on the work.

Common bricks at per thousand.
Seconds bricks at do.
Stock bricks at do.
Purpose made radiating common bricks at per thousand.
Purpose made radiating seconds bricks at do.
Ardwick lime at per ton.
Buxton lime at do.
Cement at per cask of 3 cwt.
Sand at per cubic yard.
Mortar at per hod.

Labour.

Bricklayer at per hour.
Labourer at do.
Cart, horse, and man at per hour.
For each horse extra add per hour.

Schedule of Prices for Mason's Work, as referred to in the conditions of Contract.

	£	s.	d.
Bedding and jointing old stone, and setting in even and regular courses in mortar, per cubic yard . . .			
Spring course for arches, Bolton stone, boasted top and sides, at per cubic foot			
Flag stones of Bolton stone, boasted edges, at per foot cube			
Bed stones for girders, top boasted, at per cube foot . .			
String course, tooled, weathered, throated, and boasted in front for stone, and labour, at per cube foot . . .			
Coping stone, tooled, weathered, joggled, and boasted on top, soffit, and edges for stone, and labour, at per cube foot			

V.—*Specification for sinking and steyning a* WELL *upon the Estate.*

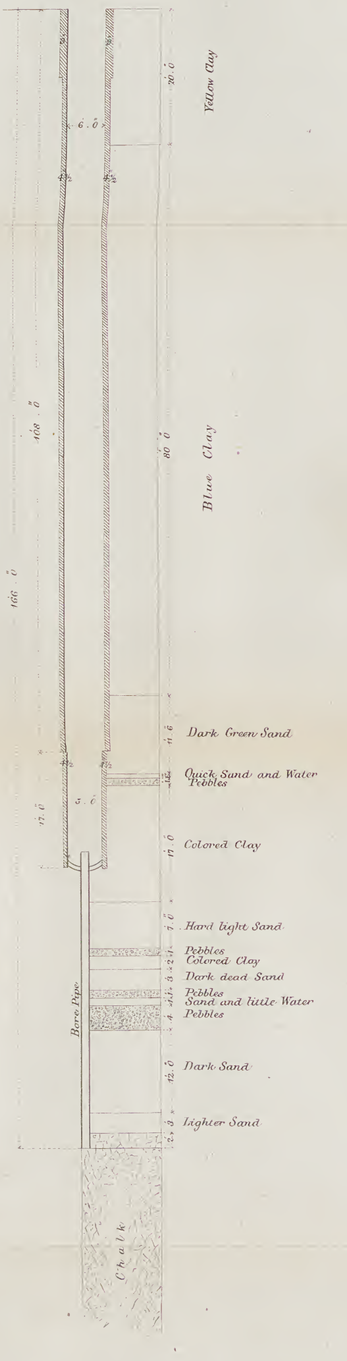
1. The various works described in this specification, or indicated upon the accompanying drawing, are to be executed in the best and most workmanlike manner, of the best materials of their respective descriptions, and both the quality of the work and that of the materials shall be such as to be satisfactory to the surveyor or engineer of the society. The contractor shall be bound to conform to all the orders or instructions given to him by such engineer, and particularly to remove at once from the premises of the society any materials which may be objected to.

2. The depths indicated upon the drawing are only to be considered approximations to those which will be found actually to exist. If it should be found necessary to vary any or all of them during the execution of the works, it shall not, therefore, affect the validity of the contract to be entered into on the subject of this well. Any difference in the nature or character of the works shall be allowed for in the settlement of the account, according to the schedule of prices hereunto annexed.

3. The engineer shall be sole judge of the necessity for altering any of the conditions of the contract, and no variation from the depths, dimensions, or materials shown or described shall be made without an express order in writing from him to that effect.

4. The engineer shall be sole judge or arbitrator in any dispute which may arise, either with respect to the interpretation of this specification, drawing, or schedule of prices, and his decision upon any question with respect to the execution of the work or to the application of the prices shall be final and binding, and without

WELL AT BARNET.



SCALE OF FEET

10 5 0 10 20 30 40 50 Feet

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PLATE II

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appeal, any custom or rule of court in law or equity to the contrary notwithstanding.

5. The contractor shall be bound to keep upon the works a foreman, clerk, or other person to whom orders may be given or observations made, in the same legally binding manner as if given to himself. It is also to be understood that the engineer shall be entitled to discharge any man from the works whom he may consider to be incompetent or unfit to be employed thereon.

6. If the contractor should neglect to remove any materials objected to by the engineer, the latter shall be, and hereby is, entitled to remove them at the cost and risk of the said contractor, in such way as the engineer may think fit, without thereby giving rise to any claim for compensation of any kind or description soever.

7. Moreover, if the contractor neglect to conform to any order given him by the engineer, the latter shall be, and hereby is, empowered to adopt whatsoever measures he may deem advisable to complete the works to his satisfaction, and to deduct the cost thereof from any sum due to the said contractor.

8. The contractor shall be liable for any damage that may be sustained by the occupiers of the adjoining lands, in consequence of any trespass committed by his workmen.

9. The works shall be commenced within three days of receiving a written order from the engineer to that effect; and be carried on, without intermission, to his satisfaction. The postage of the order to commence shall be considered a legal delivery.

10. Payment shall be made for this well in the following manner: The sum of one-third of the total amount of the contract shall be paid when the brickwork of the well shall have been completed to the depth where its diameter alters from 6 feet to 5 feet clear internal diameter. A second payment, equal to one-third of the

amount of the contract, shall be paid when the boring has been completed, examined, and received by the engineer. The remaining portion, or the balance of the contract, shall be paid after the expiration of a delay of three months from the date of the first reception above named. During this interval, the engineer shall be entitled to test the works in any manner he may think proper, and if any defect should then become apparent, it shall at once be rectified, without charge, by the contractor; or, in case he should fail so to do, it shall be lawful for the engineer to employ some other person for that purpose, at the expense of the said contractor. The above payments will only be made upon presentation of certificates, from the engineer, that the works have been executed to his entire satisfaction.

11. The works* are to consist of an excavation for a brick steyned well, of the dimensions cited below, and of an 18-inch bore pipe carried from the bottom of this well to the chalk.

12. The first 10 feet in depth of the well shall be lined with the best stock brickwork, set in the best Roman cement, and of a thickness of 14 inches. The bricks shall in no case be laid as stretchers; proper bond shall be observed, and the backs of the joints well flushed in. The clear internal diameter shall be 6 feet. Provision shall be made in the estimate for a 6-inches thick elm circular, rebated curb on the top, 12 inches wide, the value of which shall be deducted, if it be not used.

13. Below this 14-inch work, the well shall be carried to a total depth from the surface of 108 feet, of the same clear internal diameter as before (6 feet), and lined with a steyning of brickwork in cement, 9 inches thick. This portion of the well is the one most likely to vary from the dimensions now given.

14. At 108 feet, or thereabouts, from the surface, the

* Plate 11.

diameter of the well shall be contracted to 5 feet in the clear, and it shall thence be continued to a depth of about 125 feet from the surface to the bottom of the steyning, which shall have a thickness of 9 inches, and be executed in brickwork set in cement. It is desired to keep the lowest part of this steyning 5 feet above the bottom of that stratum of the basement beds of the London clay known as the mottled clay. It will therefore be necessary for the contractor to bore in advance of his work when he arrives at this formation.

15. The bottom of the excavation shall then be floored over with a counter arch of brickwork in cement, and a wrought-iron pipe inserted, and made water tight all round, to allow the completion of the bore.

16. From thence a boring shall be made to the chalk formation of such dimensions as to receive lining pipes of 18 inches clear internal diameter. These lining pipes shall be of wrought iron of No. 16 wire gauge, and perforated with holes $\frac{1}{8}$ of an inch in diameter, every 3 inches apart, excepting in those lengths which traverse the mottled clay and the two lowest lengths. The pipes shall stand up 5 feet above the paving of the well, and be let at least 2 feet into the chalk. A proper rose head shall be provided and fixed over the pipes, with all necessary nuts and screws, to prevent anything from falling into the bore hole. The pipes shall have proper collars and joints, and present, as said above, a clear internal diameter of 18 inches.

17. Provide in estimate for, and fix as may be directed, No. 4 Bramley fall blocks, wrought on four sides each, to receive bearings for pumps. These stones shall be let securely into the brickwork, and well pointed and bedded with slates and cement; their dimensions are to be estimated in each case at 3 feet, by 2 feet, by 1 foot 6. A sum of 5*l.* is also to be provided in the estimate for masons' time for attending engineers to fix

the pump; this sum to be deducted if the said pumps should not at once be fixed.

18. Provide in estimate a 3-inch thick framed elm cover, with trap properly hinged with back flaps, and strong padlock and hasp, staple, &c., for top of well.

19. The stocks shall be of the best description of sound, hard burnt, ringing, grey stocks, of good shape, and totally free from any under burnt or place bricks. The cement used shall be the best Roman cement, to be obtained from a manufacturer approved by the engineer. The sand shall be clear, sharp sand, free from clay, loam, or dirt. Samples of all these materials shall be deposited with the engineer, and submitted to his approval; and in the execution of the work, the materials used shall be at least equal to sample. The elm shall be free from sap, shakes, frosted or decayed wood, or large dead knots. The Bramley fall stone shall be of the best and hardest description, to the satisfaction of the engineer. The ironwork shall be also of the best quality of plate or wrought iron, and put together in the most workmanlike manner. The cement shall be used neat, or without any mixture of sand, if the engineer should consider it to be necessary so to do; and in no case shall the proportions of the cement and sand respectively exceed two of the former to one of the latter. It will, however, only be necessary to use the cement neat when a powerful spring has to be kept back, or to execute the steyning under water.

Schedule of Prices for extras or omissions to be filled in by the Contractor.

Excavating well to receive 9″ steyning, of 6 feet clear internal diameter, to a total depth of between 100 and 120 feet from the surface, per foot forward of depth.

Do. do. if between 120 and 140 feet depth, do.

Do. do. ,, 140 and 160 feet, do.

Excavation for 9″ steyning, of 5 feet clear internal diameter, between 110 and 130 feet from the surface, per foot forward of depth.
Do. do. between 130 and 160 feet, do.
Do. do. „ 160 and 200 feet, do.
Brick steyning in cement 14″ thick, not exceeding 20 feet deep, at per foot forward of depth.
Do. do. 9″ thick, not exceeding 130 feet in depth, do.
Do. do. 9″ thick, between 130 and 160 feet in depth, do.
Do. do. „ 160 and 200 „ do.
Boring for 18″ clear pipe in sand, or clay, between 130 and 200 feet from surface, per 10 feet length.
Do. for 12″ do., between 160 and 250 feet from surface in chalk do.
18″ wrought-iron pipe, furnished and fixed as in specification (Article 16), per foot forward.
12″ do. do. do.
Bramley fall stone, per foot cube, no labour .
Brickwork in cement, per rod, all labour .
Stocks, per thousand .
Cement, per bushel .
Sand, per yard cube .
Well sinker, per day .
Bricklayer, „ .
Labourer „ .

VI.—*Specification for Steam Engine, &c., and Articles of Agreement entered into on the twenty-fourth day of February, one thousand eight hundred and fifty-eight, between G. T., of the Waterford Ironworks, in the County of Hertford, Engineer (hereinafter called "the Contractor"), for himself, his Heirs, Executors, and Administrators, and the B. L. C., Limited (hereinafter called "the Company"), for themselves, their Successors, and Assigns. That—*

1. The contractor shall supply, execute, and perform and deliver, for and to the company, the materials, works, and services comprised in the specification hereunder written, or to be fairly inferred therefrom, or from the

nature and object of the works included therein, according to the conditions and meaning of the specification, and to the satisfaction of the engineer for the time being of the company, who is hereinafter referred to as "the engineer," the present engineer being .

2. All measurements and drawings required by the contractor shall be taken and made by him at his own risk, but subject to the supervision and approval of the engineer, and all works and things not expressed in the specification which are, or which the engineer shall certify to be, necessary to the completion of the work included in this contract, shall be considered as part of this contract, and all details not provided for by the specification shall be performed according to the direction of the engineer, who shall have power to correct the specification in any details which he shall consider to be erroneous. But no omission or error in the specification, or in any drawings provided or to be provided for the purposes of this contract, and no neglect on the part of the engineer to supply or correct such omission or error, or to superintend or give directions concerning any part of the work, shall excuse the contractor from completing in all its details the work which is the subject of this contract, so as to be fit in all respects for the service for which it is intended. Provided that the contractor shall not be required to supply or perform any materials, work, or service expressly or by necessary implication excluded from the specification.

3. The contractor shall perform this contract with such variations of, omissions from, or additions to, the works hereunder specified as the engineer shall from time to time direct, and shall allow or receive such (if any) deductions from or additions to the contract price, and such deductions from or additions to the time for completing the contract, as the engineer shall certify to be reasonable.

4. The engineer, and any persons deputed by him for that purpose, shall at all working hours have free access to the factories and places where any part of the drawings, patterns, materials, or work provided or in progress for the purposes of this contract shall be, for the purpose of testing the sufficiency thereof, and shall have the free assistance of the contractor and his servants and workpeople, and the use of the necessary appliances, to be provided by the contractor, for testing any materials or work; and no materials or work which the engineer or his deputy shall condemn shall be used in performing this contract, and all materials and work on the company's land which the engineer or his deputy shall, at any time before the expiration of twelve calendar months after the completion or supposed completion of the contract, condemn (although previously fixed or fitted, and passed or approved of), shall be forthwith removed from the company's land, and proper and suitable materials or work substituted by the contractor to the satisfaction of the engineer.

5. If the engineer, at any time or times, give to the contractor notice in writing that any materials or work, to be specified in such notice, ought already to have been supplied or done, or, having been supplied or done, is defective, and ought to be replaced or made good, and that the same must be supplied, done, replaced, or made good within a time to be stated in such notice, and the contractor make default in complying with such notice, the engineer or the company may cause such materials or work to be supplied, done, replaced, or made good, and the cost thereof shall be paid by the contractor, and may be deducted from any moneys payable to him under this contract.

6. No deviation on the part of the contractor from the terms of the specification, or from any written directions of the engineer, shall be considered to have been

authorised, unless directed or approved of by the engineer or his deputy in writing.

7. The contractor shall from time to time, within forty-eight hours after any verbal or written request by the engineer or his deputy, furnish to the engineer or his deputy a full and complete statement of all the materials and work for the time being respectively provided, executed, and fitted or fixed in such detail manner and form as shall be required.

8. If the works included in this contract are not completed to the satisfaction of the engineer on the day mentioned in the specification, or on such earlier or later day as the engineer, in exercise of the power hereby given to him, shall fix, the contractor shall on each Saturday after such day, until the completion of the work to the satisfaction of the engineer, pay to the company, as liquidated damages for the delay only, the sum of 10*l.* in respect of each week or fraction of a week of such delay, and shall also pay to the company, as additional special damages, the amount of such compensation, allowance, or damages (if any) as, by virtue of any existing or future agreement or arrangement with any person or persons being a contractor for any work connected with the subject matter of this contract, or otherwise interested in the timely completion of this contract, the company shall pay to such person or persons, and also the amount of any expenses to be incurred by the company in completing the works or otherwise by reason of the contractor's default, and all or any part of such respective damages may be deducted from any moneys payable to the contractor under this contract.

9. If the contractor is delayed by the non-performance of any work not included in this contract, and for which the contractor is not responsible, the engineer

may allow the contractor such further time as he shall think reasonable.

10. All materials and work brought upon the company's land, and all materials and work elsewhere from the time of the appropriation thereof to the purposes of this contract, shall be the absolute property of the company, and any such materials and work shall be marked as belonging to the company at the engineer's request. But all materials and work which shall not finally form part of the completed works hereby contracted for shall, after the full performance of this contract in every respect by the contractor (including the payment of any damages and moneys payable by him), be returned to the contractor for his own use, and, in the mean time, shall be at his sole risk.

11. All machinery, tools, and things brought by the contractor on the company's land shall be considered to have been thereby mortgaged or pledged to the company as a security for all damages and moneys payable by the contractor under this contract, and may be sold by the company in satisfaction thereof, and shall not be removed without the company's consent, but shall be in all respects at the sole risk of the contractor.

12. All losses, failures, accidents, and damages, of whatever kind and from whatever cause, which shall at any time or times during the performance of this contract, or before the expiration of the period of trial and maintenance provided for by the specification, happen to the work, or any materials, tools, or work provided or done by the contractor, or to any person or persons whomsoever, or any property whatsoever, shall, as between the company and the contractor, be wholly borne and made good by the contractor, who shall indemnify the company against the same; and no loss, failure, accident, or damage shall entitle the contractor

to any extension of time, unless the engineer shall expressly allow the same.

13. If by reason of the slow progress of the work, or of the contractor's bankruptcy or insolvency, or of any arrangement between the contractor and any of his creditors, or any execution against the contractor or any of his goods or estate, or for any other reason to be stated by the engineer, the engineer shall certify that in his opinion the contractor is unable to perform his contract in due time, or if the contract is not performed in due time, the company may then, or at any time thereafter, take all or any part of the work out of the contractor's hands, and cause the same to be completed by any other person or persons, and for that purpose may use all or any of the drawings, patterns, materials, and finished or unfinished work provided or done by the contractor for the purposes of the contract, and all or any of the machinery and tools provided by the contractor, and being on the company's land, without paying for the use thereof, or any loss thereof or injury thereto, and may employ any of the contractor's servants or workpeople, and all the expenses incurred by the company in completing the work, or otherwise occasioned by the contractor's default, with interest thereon at 5*l.* per cent., shall be paid by the contractor, and may be deducted from any moneys payable to him under this contract, and the said weekly sum of 10*l.*, for liquidated damages for the delay only, shall be continued to be paid by the contractor until the completion of the works, or as to the work or the part of the work which shall have been taken out of the contractor's hands, until the expiration of the period within which the company might reasonably be expected to procure the same to be completed, such period to be certified by the engineer.

14. The contractor hereby absolutely assigns and

agrees further to assign to the company all the drawings, patterns, materials, work, machinery, tools, and things hereby agreed to become the property of, or to be mortgaged or pledged to the company, and hereby irrevocably authorises the engineer, as the attorney and in the name of the contractor, from time to time, by deed, writing, or orally, or by manual delivery, or sign, or otherwise, further to assign and deliver over to the company all or any of such drawings, patterns, materials, work, machinery, tools, and things as aforesaid; and the contractor further irrevocably licenses and empowers the company, by any agent or servant, to take possession of all or any of the said drawings, patterns, materials, work, machinery, tools, and things, and convert the same to the use of the company, according to the intent of this contract, and for that purpose to enter into or upon any building or land where the same respectively may be.

15. The price to be paid by the company to the contractor in full satisfaction of all demands on account of or in relation to this contract is 720*l.*, subject to such diminution or increase and such deductions as are provided for by this contract.

16. The said sum of 720*l.*, or in case of any alteration in the contract such other sum as the engineer shall for the time being certify to be the contract price, shall be paid by two instalments, the first instalment to be one half of the said original or varied contract price, and to be paid when the engineer shall certify that the contractor has proceeded with due diligence, and has delivered on the company's land the engine, boiler, and pumps mentioned in the specification, and the remainder of the contract price shall be paid when the works shall have been completed and maintained for the space of three calendar months to the satisfaction of the en-

gineer, to be certified by him. But such payments shall be subject to any deductions provided for by the contract, and no payment shall be made except upon the certificate of the engineer.

17. All disputes and differences between the contractor and any other person or persons employed for any purpose on the company's land, whether by the company or by the contractor, or by any other person, and all disputes and differences between the company and the contractor in any manner relating to this contract (including disputes and differences as to the construction or application of this contract), shall be finally determined by the engineer, and this agreement for the submission of disputes and differences between the company and the contractor shall be made a rule of the Court of Queen's Bench at Westminster.

18. The contractor shall not without the consent of the engineer make any sub-contract for the execution of the work, or any part thereof, or assign or let this contract, or any part thereof.

The Specification above referred to.

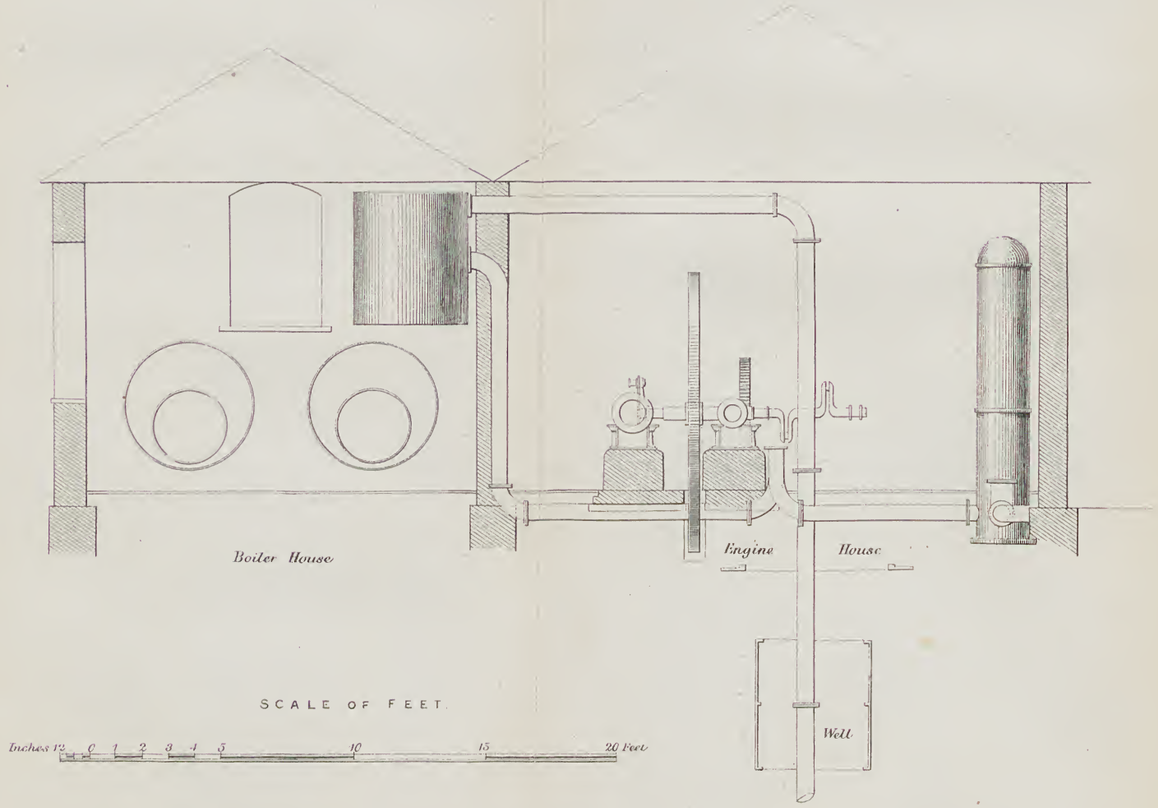
1. The works comprised in this contract, and referred to in this specification, are the materials and manufacture of one 10-horse power double-acting steam engine* and pumps, with boiler, air vessel, and other apparatus, and the delivery, fixing, and setting to work the same on the company's premises, upon their estate, near , in the county of .

2. The contract is to include the whole of the mechanical materials, labour, and carriage, as well as the use, wear and tear of all tools, implements, and other matters and things necessary for the due and proper completion, trial, and maintenance of the works, ac-

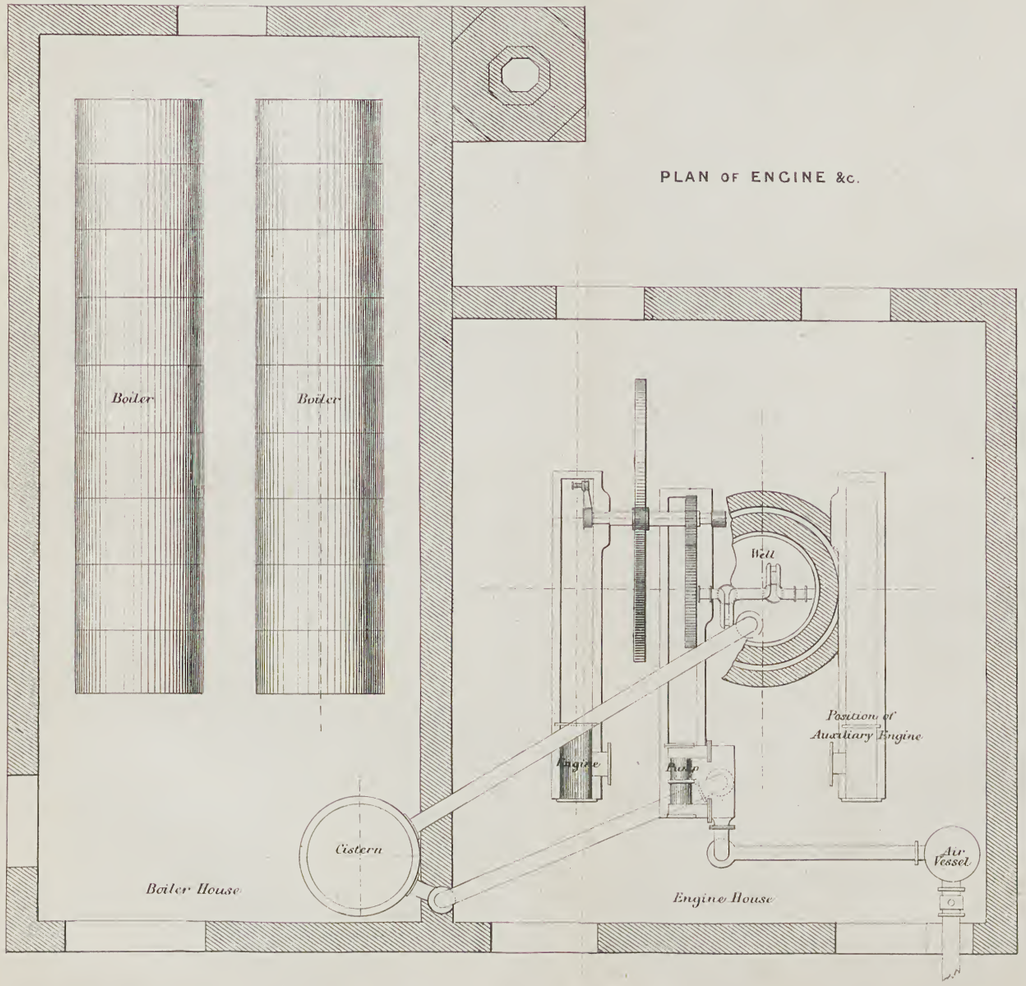
* Plate 14.

ENGINE HOUSE.

TRANSVERSE SECTION OF ENGINE &c.



PLAN OF ENGINE &c.



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cording to the conditions and stipulations hereinafter contained.

3. The following works are included in the contract, viz. :

4. One steam engine, complete.

5. One boiler, with fittings, comprising damper, frame, pulleys, chains, &c.

6. The pipes and connexions for warming and conveying the feed water to the boiler.

7. One double-acting pump, with plunger, and two single-acting pumps, with buckets and valves complete.

8. One air vessel of the size hereinafter specified.

9. The steam pipes and the exhaust pipes, as far as 10 feet beyond the engine house.

10. The suction and delivery pipes, to about 6 feet beyond the check valve at the engine house.

11. A check valve between the pump and the air vessel, with box and cover, together with all needful and proper apparatus, attachments, and connexions, including the cast-iron girders for supporting the engine and pumps and the engine-room floor. A manhole plate and rabeted frame for floor of pump room, to give access to pumps, &c., all holding-down bolts and plates for fixing the engine girders, pumps, and air vessel. All plates, bolts, and other ironwork required to support and secure the boiler, and all other ironwork whatsoever appertaining to the engine, boiler, and pumps.

12. One set of spanners complete.

13. One set of stoker's tools complete.

14. The engine is intended to pump water from a well sunk into the chalk upon the estate, and to deliver it into a reservoir at a distance of 820 yards or thereabouts, through a 6-inch diameter cast-iron pipe.

15. The ordinary level of the water in the well, when

not acted upon by pumping, will be about 150 feet below the surface of the ground, or about 300 feet below the high water line of the reservoir.

16. The power of the engine is to be such that it will raise 7000 gallons per hour into the reservoir in regular work.

17. In the arrangement of the engine provision is to be made for fixing another engine of equal or greater power, to work conjointly therewith when required.

18. The engine, boiler, pumps, and appurtenances are to be constructed and completed in accordance with this specification, which is intended to describe generally their qualities, dimensions, provisions, and duties, and it is to be understood that the contractor may use, subject to the approval of the engineer, any models he may have in his possession applicable to the work, but he is to arrange and be responsible for the proper strength, dimensions, and proportions of all the parts and details of the said engine, boilers, pumps, and appurtenances.

19. The contractor will be required to furnish to the engineer, on or before the twenty-fifth day of March, , working drawings of the engine, boiler, pumps, and appurtenances, showing by figured dimensions the positions of all the girders, holding-down bolts, floor plates, and other parts in immediate connexion with the buildings, in order that the drawings for the brickwork and masonry of the boiler and engine houses may be properly prepared, and the buildings adapted to receive the machinery.

20. The engine, boiler, pumps, and appurtenances are to be first-class work, of the strongest and most substantial description and improved construction. The materials and workmanship are to be of the best qualities of their respective kinds, and no hot blast iron whatever is to be made use of in any part of the works.

21. The engine is to be finished in the manner usually called bright work, that is, the whole of the wrought iron, steel, gun metal, and brasswork in sight is to be finished dead bright, as are likewise the covers of the cylinders, valve bonnets, shafts, connecting links, boiler fittings, and other parts, as may be directed, and it must be expressly understood that none of the working parts of the engine or pump are to be of cast iron, except with the express approval of the company's engineer, signified in writing.

22. The engine is to be a horizontal, double-acting, high-pressure, non-condensing engine, having the piston rod jointed to the connecting rod communicating with the crank shaft, which carries the fly wheel, and which is to drive the pumping crank shaft by means of a wheel and pinion.

23. Every part of the engine is to be strong enough to work with, and sustain a pressure of steam in the cylinder of 60 lb. to the square inch with perfect steadiness.

24. All the principal bearings are to be lined with brass. The side blocks to be of cast iron of proper quality.

25. The steam cylinder is to be 12 inches diameter, and of sufficient length to allow 2 feet 3 inches stroke to the piston, and to have a packed stuffing box and brass gland in both the top and bottom covers.

26. The stuffing box is to have proper means of applying oil, with a neat brass oil cup and cover.

27. The cylinder cover is to be provided with a high-pressure grease cock, so made that the grease can be readily introduced into the cylinder when the engine is at work.

28. All the steam and water joints are to be planed to a true and even surface, and put together metal and metal.

29. The piston is to have a metallic spring packing of the best and most approved description, and the piston rod is to be of best steel, $1\frac{7}{8}$ inches diameter, or of faggoted Low Moor iron, to the satisfaction of the company's engineer.

30. The slide valve is to be adjusted to work the steam expansively, by cutting it off at two-thirds of the stroke from the beginning.

31. The cylinder and valve casings are to be clothed with treble feltings, and afterwards neatly cased with corrugated iron, to prevent the escape or radiation of heat, and the steam pipes are to be covered with felt and canvas, neatly painted.

32. The bed plate is to be cast in one piece, and of sufficient strength for the full power of the engine.

33. The crank shafts are to be of wrought iron, and fitted to carry a sheave for driving machinery outside the engine house; the gudgeons to be properly turned to work in, one bearing on the engine framing and the others on a proper plummer block, which, with all necessary holding-down bolts, are to be provided.

34. The fly wheel is to be $10\frac{1}{2}$ feet outside diameter, having a rim of proper weight and oval arms of proportionate strength.

35. The wheel and arms are to be cast in halves, well fitted and fastened together, so that no joining shall be seen; one side of the fly wheel rim is to be cored out so as to balance the weight on the crank pin.

36. In addition to the usual throttle valve, the engine is to have a regulator valve, with handle, rods, standard, and brass index pointer and plate to regulate or shut off the steam from the cylinder at a convenient part of the nozzle, and so arranged that the condensed water may be passed off through a tube and cock placed before the valve.

37. All the working parts and joints of the engine where grease is required must be provided with self-feeding brass oil cups and covers, and receivers are to be placed where necessary with proper tubes to collect and convey away the waste oil, so as to prevent the engine house being soiled with drippings from the bearings.

38. The whole of the steam, feed, sludge, and other pipes are to be provided, jointed, and fixed of sufficient sizes for their respective purposes, and furnished with all proper connexions, expansion joints, stop cocks, bends, and other necessaries, and the feed pipes are to be fitted with check valves and a safety valve.

39. Brass cocks and copper pipes are to be provided and fixed for discharging the condensed water from the cylinder bottoms; the valve casings and the steam passages and the cocks are to be made easily accessible, and capable of being opened from the engine-room floor.

40. The two single pumps are to have working barrels of $6\frac{1}{2}$ inches diameter and a stroke of 2 feet, with a suction valve of not less than $8\frac{1}{2}$ inches outside diameter. The double-acting pump is to have a working barrel of not less than 8 inches diameter, with a stroke equal to take all the water lifted by the two pumps in well, with valve and plunger and suction valve to correspond; all the pump buckets to have leather packings.

41. The pumps are to be provided with buckets and section valves of the most improved ring construction, made entirely of the best gun metal, working in brass or tin beats.

42. A tank of cast iron of sufficient strength and properly fitted together, capable of containing 600 gallons of water, together with all necessary bearing girders, bolts, and fastenings, pipes, and stop cocks connected

therewith, is to be provided and fixed in the proper position to receive the water from the two single-acting pumps, and to supply the double-acting pump with water.

43. The delivery pipes are to be 6 inches diameter, and the suction pipes 6 inches diameter.

44. The air vessel is to be of twenty times the capacity of the working barrel of the pump, and it is to have a duplicate flanged outlet for connecting a second pump, and a 6-inch stop-back valve is to be provided and fixed in the pipes between the pump and the air vessel, and a blank flange bolted on to the duplicate outlet.

45. A pipe and screw cock, 2 inches in diameter, are to be provided and fixed to relieve the pump in starting, and a similar pipe and cock, $1\frac{1}{4}$ inch diameter wrought iron, to feed the boilers from the main in case of accident to the feed pumps.

46. All the pipes are to be arranged according to the engineer's directions, so as to be as little in sight as possible, and so that the feed cocks can be opened or shut in the engine room or boiler house.

47. The strength of all the working and other parts is to be such that the pumps and appurtenances may work perfectly steady and water tight under the pressure of a column of water equal to 300 feet altitude.

48. The boiler is to be cylindrical, of the most approved manufacture, to be 23 feet long, 5 feet external diameter, with an internal flue 2 feet 9 inches in diameter, so placed as to leave a space of 6 inches between it and the boiler bottom.

49. The side plates are to be $\frac{7}{16}$ inch, and the end plates $\frac{1}{2}$ inch in thickness.

50. The flue plates and all the angle irons are to be of Low Moor iron, and all the other plates of the best B. B. H. Staffordshire plates; the joints are to be all

well caulked on both sides, and the boiler proved to be perfectly tight under an hydraulic pressure of 120 lb. per square inch.

51. The boiler is to have a cast-iron furnace front and door, cast-iron back bridge and furnace bars, damper, and frame, and cast-iron circular manhole, frame, and cover. The boiler is also to have safety valves with graduated levers to show a pressure of 60 lb. per square inch, one glass water gauge with brass mountings of the best construction, and one brass gauge cock.

52. Blow-off pipes, 3 inches diameter, are to be fixed to the boiler to communicate with the sludge tank, provided with 3-inch screw cocks with brass spindles and faces.

53. A good steam gauge capable of indicating 60 lb. pressure per square inch is to be provided with pipes and cocks to connect it with the boiler.

54. The 2-inch wrought steam pipes are to have an expansion joint, and so arranged that a duplicate engine may be attached and worked from the boiler, and for this purpose a screw steam valve 2 inches diameter, with seat, is to be provided and fixed at the junction of the steam pipe with the boiler for shutting off the steam.

55. The boiler fittings are all to be finished and fixed in a workmanlike and substantial manner, and arranged so that the boiler and its connexions with the engine may be complete in every respect.

56. The whole of the rough work included in this specification is to have one coat of oil paint before delivery, and after being fixed is to receive two coats of oil paint, the whole finished in such manner as the engineer may direct.

57. The whole of the work herein specified, as regards the general design, the quality of the materials, and the mode of execution, is to be performed and completed in

the most approved workmanlike and substantial manner to the entire satisfaction of the company's engineer.

58. The contractor is to employ at his own expense a competent foreman, constantly on the work, to insure efficient control and superintendence, and no person is to be employed or allowed to remain on the work who shall be objectionable to the company's engineer, or the superintendent acting under him.

59. The contractor, when the engine, pumps, boiler, and all the machinery, pipes, and fittings shall have been completed, shall work the engine and pumps during ten consecutive days (Sundays excepted), raising water from the well into the reservoir at the rate of 120 gallons per minute or otherwise, as the company's engineer may direct, and the engine, pumps, and boiler shall not be considered to be completed until they shall have been worked for the time above specified to his satisfaction.

60. The contractor will be required to guarantee the engine and works for one year after the completion of the contract, and if at any time during the progress of the works, or within the said period, any imperfections or insufficient workmanship shall appear, the contractor is forthwith to make good the same at his own expense, the true intent and meaning of this specification being, that the whole of the works are to be delivered up to the company properly and completely finished, and perfect in all their parts, and in conformity in every respect with the contract.

61. The engine, boiler, pump, and machinery are to be complete and set to work by the contractor within five calendar months after the date of the order to commence, or within eight weeks after the completion of the engine and boiler houses and the well, whichever period shall be the latest, under a forfeiture of 10*l.* per week, to be paid to or retained by the company (as liquidated

and ascertained damages, and not by way of penalty) for each and every week which shall elapse from and after the expiration of the period above named until the completion of the contract.

62. The works are not to be deemed finished or completed until they shall have been certified to be so in writing by the company's engineer.

63. If at any time during the progress or after the completion of the works any dispute or difference should arise between the company and the contractor as to the manner of executing the works, the quality of the materials, or as to any matter of charge or account, or as to any other matter or thing connected with the contract, they are to be referred to and finally settled by the engineer, whose decision is to be final and binding on both parties.

64. The engineer may delay the progress of the works if any circumstances should render it necessary, and may grant such extension of the time for the completion of the contract as he may think proper.

VII.—*Articles of Agreement, indented, made, concluded, and agreed upon the second day of October, in the year of Our Lord one thousand eight hundred and thirty-seven, between , of Lodge, in the County of , Civil Engineer and Contractor, of the one part, and the Company of Proprietors of the and Junction Canal of the other part.*

Whereas the said hath contracted and agreed with the said company of proprietors to com-

plete and finish, in a good and substantial and workmanlike manner, to the satisfaction of the engineer for the time being of the said company of proprietors, and agreeably to the longitudinal section made thereof and the centre line as now set out upon the ground, and according to the working drawings made for the sundry necessary works, the making, forming, and digging the intended and Junction Canal and the tunnel connected therewith, commencing at or from the canal belonging to the company of proprietors of the Canal, near a certain street in , aforesaid, called street, and terminating by a junction with the river at the graving yard of the company of proprietors of the and navigation; and also the making, covering, and fencing the towing paths, erecting the waste weirs and stop sills, making, stoning, and fencing roads or streets, erecting and building the bridges and culverts, and making all other the works hereinafter mentioned upon the terms and conditions hereinafter stated. Now these presents witness that for and in consideration of the sum of forty-four thousand five hundred and fifty-five pounds nine shillings and twopence, hereinafter covenanted to be paid to the said , his executors, administrators, or assigns, by the said company of proprietors (parties hereto), he, the said , for himself, his heirs, executors, and administrators, doth covenant, promise, undertake, and agree with and to the said company of proprietors (parties hereto), their successors, and assigns, by these presents in manner following; that is to say, that he, the said , his executors, administrators, workmen, and assigns, some or one of them, shall and will, on or before the thirty-first day of December, one thousand eight hundred and

thirty-eight, complete, finish, and execute, in a good, substantial, and workmanlike manner, and to the satisfaction of the engineer or agent for the time being of the said company of proprietors (parties hereto), the making, forming, and digging the said canal hereinbefore described, agreeably to the longitudinal section hereunto annexed, signed by , the engineer of the said company, and the said , and agreeably also to the centre line of the said canal, as now set out upon the ground, and to the specification and stipulations herein contained, and shall and will before the said time and in like manner, and by and under the like direction, complete, finish, and execute the making, covering, and fencing the towing paths, erecting the waste weirs and stop sills, making, diverting, stoning, and fencing the roads or streets, erecting and building the bridges, locks, and culverts, and making all other works necessary and proper to be made, executed, completed, and finished for the convenient using and navigating, or in respect of the said canal agreeably to and in or of the number and situation, and of the same form, size, and dimensions as are set down, specified, and described with reference thereto respectively in these presents, and in the thirteen plans, sections, and drawings made thereof respectively, and also signed by the said and the said , and hereunto annexed, and that the said canal and other works shall be so made, completed, finished, and executed in the manner hereinafter in that behalf particularly mentioned. That is to say—

That the canal shall be 6 feet deep from the top-water level to the top of the sills, and the sides to be walled throughout in the manner described hereinafter.

That a towing path shall be formed along the north side of the canal 2 yards wide, to have a coat of hard

stone 6 inches thick, broken so as to pass through a 2-inch ring.

That this stone shall have a covering of cinders or fine gravel 3 inches thick, and fall 1 inch perpendicular at 3 feet horizontal from the towing-path coping when completed. That the lock sides shall have a space or benching left of 4 yards wide from the coping on each side, such space or benching to be level with, equal in length, and parallel to the middle piers of the locks; the sides to slope 1 foot perpendicular to 1 foot horizontal from the outside of such space or benching, and the same in every other case not specified.

That all stone to be used for the purposes required in the construction of the canal, except the wall stone for backing Bridge, which must be of Collyhurst stone, shall be procured either from Blackstone Edge, the summit quarries near Littleborough, or from the Cox Green quarries near Bolton, or be stone of equally good quality, and approved of by the engineer.

That the string courses for Bridge shall be neatly tooled and wrought in the same manner and of the dimensions figured on the plan, with a course of stone under, neatly tooled, of the same depth and wrought to the same mould as the face of the casting, and to be a continuation of the same.

That the string courses for the entrances into the tunnel shall not be less than 2 feet 6 inches in length, 2 feet 2 inches in bed, 9 inches thick, and project 3 inches over the face of the brickwork; to be neatly tooled with square end joints, and to be splayed off on the upper edge 1 inch, and throated on the under edge.

That the string course for Bridge shall be the same, only to be 1 foot in thickness.

That the battlements for all the bridges and entrances

into the tunnel shall be 1 foot thick, 3 feet and upwards long, to be neatly tooled on both sides, and shall not consist of more than three courses in height.

That the pilasters for all the bridges and entrances into the tunnel shall project 9 inches below the string course, and $4\frac{1}{2}$ inches on the battlements, the string courses and battlement copings to be 9 inches and $4\frac{1}{2}$ inches extra widths, to suit such projections respectively.

That Bridge shall be built according to the plan and drawings, except the foundations to top water level, which shall be of bricks; the spandrel and wing walls, pilasters below the string course, shall be vermiculated, same as the entrance to the , to be truly bedded and jointed throughout with rustic joints 2 inches deep. That the courses in the spandrel and wing walls shall not be less than 16 inches in height, nor any stone less than 2 feet long, and each stone to go quite through the walls; the arch to be 2 feet thick, the voussoirs, or arch stones, to be neatly tooled not less than 1 foot 3 inches broad and 2 feet long, wrought true in the direction of the radius.

That the arch shall be a true semi-ellipsis, springing 1 foot above top water level, to be 12 feet high and 48 feet wide above the springing.

That this bridge shall be backed with good Collyhurst wall stone, in the manner shown on the section, properly coursed, and set flush with Ardwick lime mortar in the direction of the radius, and to be filled in and abut firmly against the solid rock or earth.

That the quoin heads for all the bridges (except Bridge, which shall be wrought according to the plan) and the entrances into the tunnel shall be below the springing of the arch, 3 feet long, 2 feet in bed, and not less than 1 foot 4 inches in thickness,

neatly tooled and set header and stretcher with rustic joints. That the quoins forming the arch for the same shall be 2 feet 6 inches deep on the face, and shall be alternatively 2 feet 6 inches and 3 feet 6 inches deep on bed, wrought true to the radius, and tooled with rustic joints, and no stone shall be less than 1 foot 2 inches in thickness, and the thickest courses shall be laid at the springers, and decrease towards the keystone.

That the springers for the bellmouthed entrance to the tunnel shall be of stone, 2 feet in bed, 1 foot 6 inches thick, and not less than 2 feet 6 inches long, neatly tooled, and wrought true from the decreasing to the increasing radius.

That a coping shall be laid on the top of the abutments of Bridge not less than 3 feet 6 inches long, 1 foot 6 inches thick, and 2 feet in bed, neatly tooled for the casting to rest upon.

That the coping for the side walls of the canal, the water wings and the towing path, and abutment of the bridges and the stock lock, shall be 2 feet 6 inches in bed, 2 feet 6 inches and upwards long, and 1 foot 6 inches thick, clean picked, with a chisel draft round each joint and on the face. That the face shall be rounded off 2 inches, and the rounded part shall project 2 inches over the face of the brickwork; the arris also shall be rounded 3 inches each way, and the whole shall be well bedded and jointed throughout.

That the coping for the locks shall be same, except as to the bed, which shall be 3 feet, and that for the wall parallel to and facing the river shall be the same as for the locks.

That the coping for the breast walls above the towing path or benching in the dockyard, and also the tunnel, shall be in every respect the same as those already described, only to be 1 foot in thickness.

That the hollow and square quoins for the locks shall be set header and stretcher, the headers not less than 4 feet deep and 3 feet long on the face, the stretchers not less than 4 feet broad and 4 feet long on the face, and shall not be less than 2 feet thick, neatly tooled and wrought true at the joints, and on every side prepared for the reception of the gates, and each stone shall be well grouted with Roman cement. That a course of stone 1 foot 6 inches thick shall be laid transversely under the threshold stones for the lower gates, in the manner shown on the plan, to extend to the sill at the end of the pitching for the counter arch, and abut against the side wall of the recess; another course 1 foot 6 inches in thickness shall extend from the end of the threshold stones to the sill at the end of the counter arch, and shall lay upon the last-mentioned course longitudinally, making together a pitching of 3 feet thick, both courses to be wrought true on every side, to be square, and set flush with Ardwick lime mortar.

That the sills or threshold stones shall be neatly tooled, wrought true in the direction of the radius, with the beds perfectly level and notched for the mitre sills, and the whole shall be set and grouted with Roman cement, with the grain of the stone downwards, and the forebays shall be built with stone backed with bricks.

That the courses of stone shall not be less than 2 feet thick, alternately 3 feet and 4 feet in bed, and 4 feet and upwards long, the joints wrought true to the back in the direction of the radius, the face clean picked, with a chisel draft round each joint on the face, and the arris of the threshold stones rounded off 3 inches on the upper edge, and the whole set flush and well grouted with Ardwick lime mortar.

That the paddle wells at the lock heads, the connecting tunnels in the piers betwixt the double locks and

the paddle well for the middle bay of the double rise lock, shall be built with stone of the dimensions figured on the plan, the sides, tops, and bottoms shall be neatly tooled and rebated together 3 inches deep, such sides, tops, and bottoms not to be less than 1 foot 6 inches in thickness, and those shown on the plan at the lock head to be 2 feet, and to be set and grouted with Roman cement, those at the paddle wells to be wrought to fit the pipe ends at the entrance, and the masonry in every instance to be notched to fit the cast-iron pipes.

That the rubbing courses of stone in the lock sides under the coping, and the rubbing courses at low-water level in the lock side, shall be each 1 foot 6 inches in thickness, with square end joints, and not less than 2 feet 6 inches in length, and go quite through the walls of the chamber.

That the two rubbing courses at low-water level shall extend round the platform of the middle pier from hollow quoin to hollow quoin below the bottom gates, shall be rounded, and shall project 2 inches on the face and go quite through the wall, and shall be neatly tooled on the rounded part.

That the course of stone forming the foundation of the side walls of the lock chambers shall be 1 foot 6 inches thick, 3 feet 6 inches in bed, and not less than 2 feet 6 inches long, levelled to the radius and wrought to lay upon the counter arch, and shall have square end joints.

That the stone sills at the end of the counter arch extending across the lock shall be rounded to the same radius as the counter arch, shall be 9 inches in thickness, and shall go 4 feet in depth, to be well jointed and tooled, and the arris shall be rounded off 2 inches.

That the threshold stones for the lower gates at the 6-feet rise lock shall be same as the other locks, except

that there are to be double sills, as shown on the plan, with the mitres set in opposite directions. That the threshold stones shall abut against each other, forming a recess for the lower gates and a recess for the flood gates, with the two 1-foot 6-inch courses laid under and abutting against the threshold stones, forming the 3-feet pitching.

That the hollow and square quoins shall be the same as for other locks.

That the masonry shall be notched for the cast-iron grooves in every instance, and for the two 20-inch paddles 9 inches deep, forming a recess for the paddles to work in at the middle bay of the double-rise locks.

That the quoins of the platforms for the levers of the lower gate shall be header and stretcher, 2 feet in bed and 3 feet long, and not less than 1 foot 6 inches in thickness, wrought to the radius and batter 3 feet, as shown on the plan.

That the stone courses forming the angular startling of the middle pier, at the entrance to the locks, shall be alternately 2 feet 6 inches and 3 feet 6 inches in bed, 2 feet thick, and splayed off in the manner shown on the plan, and battered to the radius.

That the edge coping for the two piers ascending the towing path on pillars at and , and the coping forming the parapets for the foot bridge, shall be 9 inches thick, 2 feet 6 inches high, and not less than 3 feet long, shall be neatly tooled and rounded semicircular on the upper edge, and joggled together at each joint, such joggles to be 1 inch square, well rammed with stone scabblings, and pointed with cement. That the edge or fence coping for the tunnel shall be clean picked and close jointed throughout, shall be 1 yard and upwards long, 6 inches thick, and 2 feet high, and joggled together as before described.

That a stone shall be fitted into the corners at the entrance to the Tunnel on each side in the manner shown on the plan, neatly tooled, and the corners rounded.

That the locks, the side walls of the canal, the bridges, piers, breast walls, and the whole of the brickwork, shall be built with the very best hard-burnt bricks, set flush in Ardwick lime mortar in English bond, neatly drawn and pointed on the face; the lock sides to be grouted every course, as well as the whole of the brickwork under water.

That the whole of the work, both stone and brick, shall be set flush with Ardwick lime mortar, except where Roman cement is to be used; such mortar to be made in the proportion of two of clean, sharp, river sand to one of Ardwick lime, slacked.

That the lock gates shall be made of good, sound, dark-coloured teak wood or best English oak, agreeably to the plans and the dimensions figured thereon, and shall be planked with good, sound, 2-inch dry red deal planks, and the dimensions of the scantling to be as follows, namely:

The heels, 12 inches by 14 inches.

Breasts, 12 inches by 10 inches.

Bottom bar, 12 inches by 12 inches, and 10 inches by 10 inches at the breast end.

Other bars, 10 inches by 10 inches, and 10 inches by 8 inches at the breast end.

That the stop lock shall have paddles in both top and bottom gates, and the muntins and truss bars shall be 8 inches square. The paddles shall be made of 2-inch teak wood plank. The gate levels shall be made of good, sound Dantzic timber of the dimensions figured on the plan, and the heels, bars, and breasts each shall be connected together with wrought-iron T plates let flush in

with the gates, to be 3 inches wide by $\frac{5}{8}$ of an inch thick.

That the mitre sills shall be made of beech, English oak, or teak wood 12 inches square, wedged down with three land irons on each side the mitre 1 inch square, and secured by two wedges in the manner used by the and Navigation Company.

That the screw bolts to be used for the iron T plates shall be made of round iron bar $\frac{3}{4}$ of an inch diameter.

That the drop sills at the end of the pitching, extending across the lock head above the recess of the upper gates, shall be of red deal 9 inches thick, 1 foot 2 inches deep, and shall have 3-feet hold of the walls at each end, and be planked with 2-inch deal pile planks 3 feet deep. That the connecting rod for drawing the paddles shall be 1 inch square wrought bar. That the paddle gearing, or apparatus for drawing the paddles, the collars, anchors, and pivots for the lock gates, shall be the same as used by the and Navigation Company, and cast from their patterns. That the cast-iron grooves for the paddles shall be 1 foot longer than twice the length of the paddle, shall be 3 inches wide in the groove and 2 inches deep, and 1 inch thick of metal.

That the lock gates shall have two coats of tar previous to their being hung, and the mitre sills shall have a coat of blair or tar and horse dung betwixt the stone and wood. That the canal shall be sheeted with deck planks for the distance of 42 feet from the threshold stones of the lower gates, the deck planks shall be nailed to cross sills of red deal 9 inches square, not more than 13 feet asunder, and shall be firmly wedged down to the rock with land irons and wedges, the ends to be let 1 foot 6 inches into the side walls of the canal and middle piers of the locks. That two teak wood guards shall be screwed to the forebay of each lock, to be 9 inches by 12 inches,

with a bar of wrought iron 2 inches by 3 inches bolted to them, and to be let 1 foot 6 inches into the side walls of the chamber, at each end the bolts to go through the masonry of the forebay, and to be made of $1\frac{1}{2}$ inch round iron bar, and screwed firmly to the forebay by three such bolts in each guard.

That 2-inch air or blast pipes shall be set perpendicular from the paddle wells to the top of the coping in all the locks. That the cast-iron pipes for the lock heads shall be 2 feet diameter inside, and shall be perfect castings made of cold blast iron, with good spigot and faucet joints, and shall be truly bedded and built in with the brickwork and masonry of the forebays. That the 2-feet 10-inch pipes in the middle bay of the double-rise locks shall be the same, and both shall be 1 inch thick of metal. That cast-iron grooves 6 inches deep and 6 inches wide, 1 inch thick of metal, shall be let into the masonry at the stop lock below the bottom gates, in the manner shown on the plan, for the purpose of putting in drop planks.

That the locks shall be built with bricks, except such parts as before described to be of stone, as shown on the plan for the double-rise locks, this system to apply to all the locks. That the forebays and tailbays and the masonry shall be the same except as to height, and there being no middle bay, and all shall be 6 feet from the top water level to the top of the sills, and all the locks shall be 81 feet from quoin to quoin. That the first lock from the river shall be a single lock of 6 feet rise, with double recess for the flood and bottom gates; the height of the chamber walls above the centre of the counter arch, or above the bottom sills, shall be 13 feet 6 inches. That the second lift double locks shall be 11 feet 9 inches, shall rise the height of the chamber walls above the bottom sills 19 feet 3 inches, and the

two last lifts, two double-rise locks, shall rise 13 feet 6 inches each, together 27 feet, as shown in the plan and sections.

That the masonry and brickwork for the stop lock shall be according to the plan and sections, and in other respects same as in the other locks.

That the walls of locks, where they are not in the rock, shall be well pounded behind them 1 yard thick with clay.

That the side walls of the canal shall be built with bricks 2 feet 3 inches thick, and coped with stone in the manner shown on the section. Those walls to extend through all the ponds from to the west end of the tunnel, except the space occupied by the locks, and from the east entrance to the double-rise locks, and from the double-rise locks on the towing path side to the pier ascending the towing path on pillars at the end of , forming a towing path of 4 feet wide under , and from the foot bridge to the stop lock on both sides the canal, and from thence on both sides of the canal to the junction with the Canal.

That the wall opposite to the river and round the wings to the square quoins of the flood gates shall be built with stone clean picked, and the workmanship shall be same as and equal to the walls of the new basin in the old quay yard; to be 3 feet 9 inches at the bottom and 3 feet at the top, and the courses shall not be less than 1 foot 6 inches thick, and each stone shall go and be truly jointed through the wall; no stone shall be less than 2 feet 6 inches long, and the wings shall be neatly rounded to a 6-feet radius.

That this wall shall be 13 feet 6 inches high above top water level of the river, 6 feet from the top water level to the bottom of the river, and 1 foot 6 inches from

thence to the foundation, making together 21 feet from the top of the coping to the foundation.

That a breast wall shall be built 6 feet high above the coping of the 6-feet rise lock, of the dimensions shown on the section, and shall extend on both sides of the lock from to the steps at the bottom gates, as shown on the plan, and from on both sides the canal to the platform of the double-rise lock, forming a space or towing path on each side the lock 6 feet wide, and shall be coped with stone 1 foot thick, as before described.

That the steps to be tooled shall be 6 feet by 9 inches, by 6 inches each step, and each step shall be a single stone.

That the tunnel entrances shall be built with brick, and shall have stone dressings, as shown on the drawings. The wing walls of the bridge shall be well pounded with clay behind them, also the arches 9 inches thick where they will admit of it.

That the bridge at street shall be built 4 feet 7 inches askew, as shown on the plan, and the roadway or ascent to the bridges, as well as all the streets, shall be paved with the same kind of material, and flagged to the same breadth, as they are now done with.

That the roadway betwixt the battlements at Bridge shall be 16 yards clear measure at right angles with the battlements.

That the roadway at Bridge shall be 18 yards betwixt the battlements, measured in the same manner, and both paving and flagging shall be done in a workmanlike manner, to the satisfaction of the surveyors of the highways for the town of , and all paving shall be set in a layer of 9 inches of good strong gravel.

The foot bridge shall be built with bricks, according

to the plan and the dimensions figured thereon; the edge or battlement coping shall be of stone, as before described, as well as the string courses, key stone, and springers shall be of stone neatly tooled, and the arch shall be of bricks 1 foot 6 inches thick.

That the tunnel shall be built with good, hard, sound, square brick throughout, and according to the plan and sections; and the walls forming the sides and towing path shall be 2 feet in thickness; the arch to be 1 foot 6 inches thick, and to be 20 feet from the soffit of the arch to the bottom of the canal, 3-inch 20-foot deals to act as rubbing pieces, to go the whole length of the tunnel, to be securely bolted on the off side through the side walls of the tunnel. That the edge and fence coping shall be wrought as already described.

That the towing path shall be filled in betwixt the coping and side walls of the tunnel with hard stone 1 foot thick, broken so as to pass through a 2-inch ring.

That the said , his executors, administrators, or assigns, shall provide all hoards and lights that may be required or ordered by the commissioners of police for the town of , and in every respect comply with the clauses inserted in the act for the protection of such commissioners, the surveyors of the highways for the town of , and the Company, and, in case of the falling in of any earth or rock in the progress of driving the tunnel, the said , his executors, administrators, or assigns, shall repair the same immediately, and the vacuity so caused shall be well rammed with rock or earth, and he and they shall be responsible for all damage done to the gas pipes, water pipes, sewers soughs, or other property.

That the said , his executors, adminis-

trators, or assigns, shall find all materials and workmanship, and also shall provide all centring, moulds, struts, tackle, engines, barrows, planks, and every other requisite required to complete the said canal, tunnel, bridges, platforms, &c.

That no materials or works brought on the site of the said intended canal or tunnel, or in respect of which any payment or advance shall at any time hereafter be made to or on account of the said , his executors, administrators, or assigns, by or on behalf of the said company, shall at any time thereafter be withdrawn or removed from the premises, without the consent in writing of the principal agent or engineer for the time being of the said company.

That the roadway or hauling path, supported by cast-iron pillars, shall be 3 feet wide, and consist of two pine balks, 1 foot 6 inches in breadth each, and be properly squared and slabbed; the hand rails to be 4 inches by 3 inches, to be 3 feet high on one side, and 2 feet high on the other above the upper surface of the balk; such hand rails to be planed and screwed to the T branch of the wrought-iron newels, with two screw bolts at each newel.

That the wrought-iron newels shall be opposite each other, and shall be made of round iron $1\frac{1}{4}$ inch diameter, to be bolted together by $\frac{1}{2}$-inch iron screw bolts at the foot; such bolts to go through both balks and the branch of each newel.

That the other branch shall be at right angles with the last mentioned, and shall be let in even with, and nailed to the surface of the balk.

That the cast-iron pillars shall not be more than 20 feet from centre to centre, and shall be $\frac{1}{2}$ inch thick of metal, and shall be 6 inches diameter at the bottom and 4 inches at the top, with a cast-iron top to fit both

the pillars, 1 inch thick, 2 feet 9 inches long, and 9 inches wide.

That the roadway shall be ascended by two brick piers at each end, namely, at street and street, the string course and coping of which shall be dressed as already described.

That both drift ways shall be 4 feet by 3 feet 6 inches diameter inside measure, and shall be arched and lined one brick thick the whole length.

That the lower drift way shall be 3 feet below the surface of the river, and the higher drift 3 feet below the surface of the canal.

That the feeders shall be same as the drift way and shall fall 6 inches from the engine shafts to the bottom of the canal.

That the beams for the cast-iron bridge at street shall be 23 feet long, and shall be perfect cold blast castings, the plates and side castings the same; the plates shall be $1\frac{1}{2}$ inches thick, laid perfectly close and level, and the whole shall be executed agreeable to the sections and plan.

That a waste weir shall be built at the 11-feet 9-inch rise lock head, and the situation shall be fixed by the company's engineer; to be bellmouthed 15 feet at the broad end and 4 feet at the narrowest end, and 9 feet long from the weir to the culvert, that the bottom shall be pitched with bricks, and the side walls shall stand on such pitching; the side walls shall be 14 inches thick, that a 9-inch barrel arched culvert shall be built to receive the water from the waste weir, the inside diameter to be 3 feet, and the whole to go with one regular descent from the waste weir to the pool below, the length of the culvert not to exceed 45 yards; that the sill for the waste weir shall be of stone, of the same dimensions as the edge or fence coping for the foot bridge, and rounded

semicircular on the top, and shall fall 6 inches on to the brick pitching, to be neatly tooled and set, and built in with the brickwork with Roman cement.

That a waste weir shall be built also at the 6-feet rise lock head in the manner already described, and shall descend to the drift way by a 3-feet barrel arched culvert, such culvert not to exceed 60 feet in length.

And for the considerations hereinbefore mentioned, the said , for himself, his heirs, executors, and administrators, doth further covenant, promise, undertake, and agree with and to the said company of proprietors (parties hereto), their successors, and assigns by these presents in manner following; that is to say: That he, the said , his executors, administrators, workmen, and assigns, shall and will execute the diversion of all roads, whether temporary or permanent, in such manner as the same are now, or shall hereafter be set out by the engineer for the time being of the said company of proprietors. And also that he, the said , his executors, administrators, workmen, and assigns, shall and will at his and their own costs and charges dig the necessary foundations, free the works from water, procure water for puddling for the locks, provide all stone, timber, bricks, lime, sand, iron, and all other materials, scaffolding, machines and utensils, and every other article and thing requisite to perform the whole work in a substantial and workmanlike manner, according to the true intent and meaning of these presents, and the plans, sections, and drawings before mentioned, and shall and will complete the whole to the entire satisfaction of the engineer for the time being of the said company of proprietors. And also shall and will clear and cart away the spare earth which shall arise in executing the works to the place of deposit already provided by the said company of proprietors, on

land belonging to the Company on the west side of the river , and south side of the and Railway, or to such other place or places as the said , his executors, administrators, or assigns, shall at his and their own expense provide, and then dispose of the same as he or they shall think fit. And also that the said , his executors, administrators, workmen, or assigns, shall and will make such temporary fences to prevent trespasses, and deposit the materials from time to time, to be provided by him or them for the purposes of the said works, in such convenient situation or situations as shall be appointed by the engineer of the said company of proprietors. And also that he, the said , his executors, administrators, and assigns, shall keep open and uninterrupted the roads and approaches to the houses and other premises on or near the line of the canal, and shall not nor will leave open, untunnelled, uncovered, or unprotected, the canal or works or any part thereof in any of the streets or roads within the town of , nor permanently obstruct, prevent, or hinder the free and uninterrupted passage in, over, and along all or any part or parts of such streets or roads, nor at any time obstruct, prevent, or hinder the free and uninterrupted passage of any part of the streets in aforesaid, called street, street, street, street, Lower street, and street, nor obstruct, prevent, or hinder the free and uninterrupted passage of one-half in width of the said last-mentioned streets respectively, or any of them, or any part thereof respectively, for a larger period than three calendar months, nor at any time break up or open, or have broken up and opened, or otherwise disturbed, unpaved, or incomplete in any respect, more than

30 yards in length of any one of the streets in aforesaid, called street and street, nor continue broken up or opened such portions for a longer period than three calendar months, nor erect build, make, or form the said canal and works, or any part thereof, more than 1 foot nearer to the surface of any of the said streets or roads within the town of aforesaid, than is shown in the section drawn upon the plan deposited with the clerk of the peace for the county of previously to the passing of the act authorising the construction of the said canal, nor alter the line or level of street, aforesaid. And also that he, the said , his executors, administrators, and assigns, shall and will, previously to the commencement of and during the progress of the work, from time to time, and at all times, cause such proper and sufficient hoards, fences, stages, and lights, to be erected, set up, and continued, in such situations and for such time as the commissioners of police for the town of shall judge necessary for the protection or convenience of the public, and as such commissioners shall order or direct, and shall continue the same standing and in good condition until, and shall remove the same when required by such commissioners. And also that the bridge to be constructed under street shall be so constructed as not to raise or alter the present level or surface of that street more than 18 inches in perpendicular height, and the stone or brickwork forming the top of the arch of such bridge, as well as of every other bridge (except the iron bridge before mentioned) to be erected, shall be at least 18 inches thick, and every such bridge (except as aforesaid) shall be constructed of brick or stone, as may be required by the commissioners of police for the town of aforesaid, and the said bridge in

street shall be formed so as to leave a clear road or way of 18 yards wide at the least between the battlements, and such battlements shall be full 6 feet in height above the road, and shall be closed, and shall extend 15 feet in length on each side of such bridge from the line or face of each abutment. And also that the footpaths over and across every bridge shall be of the same width as the footpath immediately adjoining or nearest to the same bridge, and such footpaths shall be well and sufficiently flagged, and the remaining width of every such bridge for the whole width of the span of the arch and of the abutments shall be well and sufficiently paved and completed. And also that the ascent of every bridge which shall be made over the canal or feeders, in the place of any other bridge, shall not be more than 1 foot in 30 feet, and a good and sufficient fence shall be made on each side of every such bridge, which fence shall be not less than 6 feet above the surface of such bridge; but this is not to authorise an increase of the ascent to the bridges in street and street, or any alteration in the bridge in street, except as after mentioned. And also that in raising and altering the bridge already made in street, the inside measure of the road over the same shall not be less than 16 yards in width, and such bridge shall not be raised more than 3 feet above the present elevation, and the inclination of the said street on the eastwardly side of such bridge shall not be raised so as to be more than $\frac{3}{4}$ of an inch to the yard in any part, and a regular inclination shall be continued on the westwardly side of such bridge from the centre of the arch thereof, and from the top of such bridge to the junction of street and street, and that the present bridge in street shall not be raised in any way. And

also that in every case where it shall become requisite in the making the said canal that the pipes of the company of proprietors of the and Waterworks, or their tenants, should be altered, raised, removed, or relaid, the said , his executors, administrators, or assigns, shall, previous to the making of the canal, give to the said company of proprietors (parties hereto) or their clerk, forty days' notice in writing, so as to enable the said last-mentioned company of proprietors to give such notice as in such case is required by the act authorising the construction of the said canal. And also that if it shall become necessary to interfere with and disturb any of the gutters, sinks, drains, sewers, watercourses, and pipes, within or belonging to the town of , or any present or future works of the commissioners, surveyors, and directors, or any of them, then, and in every such case, the said , his executors, administrators, or assigns, shall give to the said company ample and sufficient notice thereof, in order that full time and opportunity may be afforded to such company to give such notice to the said commissioners, surveyors, or directors as is in such case required by the said act. And also that he, the said , his executors, administrators, or assigns, shall not nor will, in the execution of the works, do or commit more damage or trespass to or upon any lands or grounds, or other property adjoining or near to the line of the said canal, than shall be absolutely necessary; and in case he or they shall do or commit any unnecessary and improper damage or trespass, or shall do or commit or omit to do, either by himself or themselves, or the person or persons employed by him or them, any act, matter, or thing not necessary or proper to be done or omitted in the execution of the works hereby contracted for ac-

cording to the true intent and meaning of these presents, and the plans, sections, and drawings before mentioned, whereby or in consequence whereof any fine or penalty shall be incurred by the said company under or by virtue of the said act or otherwise, then, and in every such case that he, the said , his executors, administrators, and assigns, shall and will make or pay all such fines or penalties so incurred, and also a proper and adequate compensation to the person or persons whose lands or property shall be so unnecessarily and improperly injured or trespassed upon, for or in respect of such damage or trespass; and in case of non-payment of such compensation, fines or penalties, or any part respectively on demand, then the same, or such part thereof respectively as shall be so unpaid, may be paid by the said company of proprietors, who shall and may be entitled and allowed either to retain the amount so paid (over and above the per-centage after mentioned), out of the money payable by them to the said , his executors, administrators, or assigns, or out of the same per-centage or otherwise; such amount shall and may be recovered by the said company against or from the said , his executors, administrators, or assigns, by action at law as liquidated damages. And also that he, the said , his executors, administrators, and assigns, shall and will give regular and constant personal attendance, or have proper persons to superintend the different descriptions of work, with whom the engineer for the time being of the said company of proprietors and his assistants may at all times communicate. And also that he, the said , his executors, administrators, and assigns, shall and will uphold and keep in repair the whole of the said works for the term of one year after the completion thereof, and that if before the expiration

of one year from the time of such completion any repairs in the said works shall or may be considered by the engineer for the time being of the said company of proprietors necessary to be made, and the said , his executors, administrators, or assigns shall not proceed with due diligence to make such repairs, having had seven days' previous notice so to do, then, and in any and every such case, it shall and may be lawful to and for the said company of proprietors to make such repairs in such manner as their engineer shall think proper, and that he, the said , his executors, administrators, and assigns, shall and will on demand, pay the amount expended therein to the said company of proprietors or otherwise; the said company may reimburse themselves out of the per-centage hereinafter mentioned, or the interest thereof, or may recover the amount by action at law as liquidated damages. And also that the said , his executors, administrators, workmen, and assigns, shall not make any variation in the line of the said canal as now set out and delineated on the said plans and sections before referred to without the consent in writing of the engineer for the time being of the said company of proprietors. And these presents further witness that in consideration of the covenants and agreements hereinbefore contained, and on the part of the said , his executors, administrators, and assigns, to be observed and performed, the said company of proprietors do covenant and agree with the said , his executors, and administrators, by these presents in manner following; that is to say, that they, the said company of proprietors and their successors, shall and will forthwith use their best endeavours to procure and deliver and give to the said , his executors, administrators, or assigns, such possession of and access to all

and every the lands and premises required for construction of the works hereby contracted for, as may be necessary to enable him and them to proceed with the execution of such works, pursuant to and according to the true intent and meaning of these presents, without delay or impediment. And also that they, the said company of proprietors and their successors, shall and will well and truly pay, or cause to be paid, unto the said , his executors, or administrators, the sum of forty-four thousand five hundred and fifty-five pounds nine shillings and twopence of lawful English money by such lunar monthly payments as the engineer of the said company of proprietors shall by writing under his hand certify to be proportionate to the advance or progress of the works hereinbefore covenanted and agreed to be completed, and to the stone and other materials actually wrought or prepared and ready for use, and which shall from time to time have been provided by the said , and brought on to the side of the said intended works or some part thereof (subject, nevertheless, to the reduction or retention of the per-centage or other moneys as hereinafter provided for). Provided always, nevertheless, and it is hereby declared and agreed by and between the said parties hereto, that for the purpose of securing the execution of the said works according to the terms and conditions of these presents, it shall and may be lawful for the said company of proprietors, their successors, and assigns, to retain the sum of five pounds per centum upon the amount of all such moneys as shall from time to time be certified by the engineer for the time being to be due to the said ; his executors, administrators, or assigns, for or in respect of the work to be done by him or them, until the expiration of one year from the time of the completion of the said works,

for which sums so retained, or for so much thereof as shall from time to time remain in their hands, the said company of proprietors shall pay and allow interest to the said ', his executors and administrators, after the rate of four pounds per centum per annum (subject, nevertheless, to the stipulations and agreements affecting the same herein contained), such interest to be payable half-yearly. Provided also, and it is hereby further declared and agreed by and between the said parties hereto, that should it appear to the engineer for the time being of the said company, at any time before the work shall be completed, desirable to make any variation in the line of the said canal, or any alteration in the plans or designs of the said intended works, or in the mode of executing the same according to the terms of this agreement and the said sections, plans, or designs, then and in every such case he, the said , his executors, administrators, and assigns shall and will adopt such variation or alteration, and an allowance shall be made either for or against the said , his executors, administrators, and assigns, as the case may be, the amount of such allowance being governed and ascertained by a measurement and estimate grounded on the rates, prices, terms, and admeasurements mentioned and specified in the schedule hereunder written. And it is hereby further declared and agreed that such variation or alteration shall not vitiate or open the covenants and agreements in these presents contained further than as regards such part or parts thereof as is or are particularly applicable thereto or affected thereby, and that only so far as is necessary for carrying such variation or alteration into effect, and that after such variation or alteration, and when the allowance in respect thereof for or against the said , his executors, administrators, and

assigns, shall be fixed, he and they shall be responsible for the due execution of the work according to the altered plan, and for the maintaining the same for the space of one year from the completion thereof, in like manner as if such variation or alteration had formed part of the original agreement. Provided also, and it is hereby further declared and agreed, that if in the execution of the said works or any part thereof it shall be found necessary or deemed expedient by the said company of proprietors or their successors, that the said , his executors, administrators, or assigns should puddle the bottom or sides of the said canal (except the locks thereof) or tunnel, or should underpin any erections or buildings under or near which the same shall be made, or should alter, raise, remove, or relay any of the pipes of the company of proprietors of the and Waterworks, or should divert, alter, or vary, or interfere with or disturb any of the gutters, sinks, drains, sewers, watercourses, or pipes within and belonging to the town of , or any present or future works of the commissioners, surveyors, and directors, or any of them, or that he or they should do or execute any other work not specified or shown in or by these presents, or upon the said plans, sections, and drawings, and which shall be in addition to the works therein provided for, then and in every such case the same shall respectively be paid for to the said , his executors, administrators, or assigns, according to the schedule of prices hereunto annexed, over and besides the said sum of forty-four thousand five hundred and fifty-five pounds nine shillings and twopence. And it is hereby further declared and agreed that the said , his executors, administrators, and assigns shall satisfy himself and themselves as to the accuracy of the lengths and

heights of the longitudinal and cross sections, and shall also acquaint himself and themselves with the terms and restrictions imposed by the before-mentioned act, and conform thereto in all respects. Provided always, and it is hereby further declared and agreed, that in case default shall be made in completing the said works in a workmanlike manner, and according to the terms and conditions, within the time herein specified, then and in such case the said , his executors, administrators, or assigns, shall forfeit and pay to the said company or their successors for each and every day which shall elapse after the time specified for the completion of the said works, until the same shall be finally completed as aforesaid, the sum of fifty pounds as a fixed and stipulated amount of damages in respect of such default, without being liable to be reduced in case the same exceed the amount of damages occasioned by such default, or in case no such damages be sustained, subject only to such deductions as may be made therefrom under the stipulations hereinafter contained, in the event of such default arising by reason of the said , his executors, administrators, or assigns being unable hereafter to obtain possession of the land and premises necessary for the execution of the said work; and in case the said , his executors, or administrators shall neglect or refuse to pay such forfeiture to the said company or their successors on demand, they, the said company or their successors, shall and may retain or deduct the same out of the percentage so to be retained by them as aforesaid, or may recover the same, or such part thereof as shall not have been so paid or retained as aforesaid, by action at law as liquidated damages. And it is hereby further declared and agreed, that in case the said works hereby contracted for shall be completed in a workmanlike manner, and

according to the terms and conditions herein contained, or if the said company of proprietors shall navigate the whole line of the said canal and tunnel before the time specified for the completion thereof, then and in either of such cases the said company or their successors shall pay (as a bonus) to the said , his executors, administrators, or assigns, the sum of twenty pounds for each and every day which shall elapse after the completion of the said works before the time herein specified for that purpose. And lastly, it is hereby declared and agreed that if any dispute or question shall arise between the said company or their successors, and the said , his executors, administrators, or assigns (except such as are hereby authorised to be decided by the engineer), before the commencement or during the continuance of the said works, or within two years after the completion thereof, either on the construction of these presents, or any work, matter, or thing to be done in pursuance thereof, or respecting the mode of doing the same or otherwise in relation thereto, or in case any claim shall be made by the said , his executors, administrators, or assigns, for compensation or reduction of penalty in consequence of any delay to which he or they may hereafter be subject in obtaining such necessary possession or access to the lands or grounds forming the site of the said canal or works, then every such dispute, question, or claim, shall be referred to the arbitration of two indifferent persons, one to be named by each party in dispute, or in case either of the parties shall neglect or refuse to join in such nomination, then both of the arbitrators shall be named by the other party, and in case such referees cannot agree upon an award, then such dispute or question shall stand referred to the umpirage or arbitration of such one person as the said two referees shall, before they

proceed in the reference by any writing under their hands, appoint, and the award which shall be made by the said two referees, or by their umpire, concerning the premises, shall be conclusive, and this submission to reference may be made a rule of any one of the courts at Westminster on the application of either of the parties in dispute.

In witness whereof the said hath hereunto set his hand and seal, and the said company of proprietors of the and Junction Canal have hereunto caused their common seal to be affixed the day and year first before written.

The Schedule above referred to.

	£	s.	d.
Brickwork in the locks, per cubic yard	1	0	0
Ditto in the tunnel „	1	2	0
Ditto in the side walls of the canal, per cubic yard	0	18	0
Ditto in fence walls from one to two bricks thick, per cubic yard	0	18	0
Ditto in breast or other walls that may be required to support the banks, per cubic yard	0	18	0
Driving the driftway and feeders, according to section, with 9-inch rings, per lineal yard	3	0	0
Coping for the side walls of the canal, per cubic foot	0	2	8
Edge coping to hauling way in the tunnel „	0	3	0
Masonry in the river wall „	0	2	2
Coping for the locks and river wall „	0	2	6
Ditto for breast and river walls as stated for the breast wall in the dockyard and hauling path wall in the tunnel, per cubic foot	0	3	0
Edge or fence coping for hauling path in the tunnel, per cubic foot	0	3	0
Masonry in the hollow quoins of the locks, per cubic foot	0	3	0
Ditto in the sills, stone pitching in the tailbay, and threshold stones, per cubic foot	0	2	6
Masonry in the forebays, per cubic foot	0	2	6
Ditto in the paddle wells and connecting paddles, per cubic foot	0	2	6
Ditto in the square quoins of the locks, per cubic foot	0	2	0
Ditto in the 1-foot 6-inch rubbing courses for locks, per cubic foot	0	2	0
Ditto in the edge or fence coping for the piers to the timber roadway and foot bridge, per cubic foot	0	3	0

Ditto in the battlement coping for the bridges and tunnel entrances, per cubic foot	0	2	8
Ditto in the string courses for ditto, per cubic foot	0	2	8
Ditto in the wing and spandrel walls for Bridge, per cubic foot	0	2	2
Ditto in the arch for Bridge, per cubic foot	0	2	0
Ditto in Collyhurst stone backing for Bridge, per cubic yard	0	18	0
Excavating rock in the tunnel, per cubic yard	0	5	0
Ditto clay or other earth in tunnel ,,	0	5	0
Ditto foundations for breast or other walls, per cubic yard	0	2	3
Extra excavating in any other part of the canal than the tunnel, per cubic yard	0	2	3
Roadway on cast-iron pillars, including timber and all other materials, per lineal yard	0	4	3
Puddling, per cubic yard	0	0	6

Signed, sealed, and delivered (being first duly stamped) by the before-named in the presence of .

VIII.—*Specification of the Stonework required in the construction of a* Gas-holder Pit *and* Retaining Wall.

QUALITY OF STONE.

The whole of the stone to be the best Saddlesworth stone, free from cracks, veins, or any defects, set in every instance on its natural bed.

SPECIAL YARD FOR WORKING STONE.

The contractor to provide and find, at his own cost, a suitable place to work the different stones; each block must be brought on the spot worked out in every respect as per specification ready for building, and any extra amount of carting, or other expenses whatsoever incurred thereby, to be included in the price of the stonework.

COLUMN STONES.

The column stones to be 7′ 6″ × 5′ × 1′ 10″ thick; the bottom beds to be boasted, the top and sides to be neatly tooled, with the edges rounded off as per drawing; four holes to be drilled in each stone to receive three bolts.

STONE CURB.

The curb stone to be 16 inches deep and 9 inches thick, well bedded in lengths of not less than 4 feet; the bottom bed to be boasted, the sides tooled with a tooled semicircular top. The end joints to be boasted, and dowel grooves to be cut in the ends of each stone to receive dowels 4″ × 1″ × $\frac{1}{2}$″, which must be provided by the contractor.

STONE COPING.

The top of gas pit wall to have a stone coping 2 feet 4 inches broad and 6 inches thick, in lengths of not less than 4 feet; the bottom beds and joints to be tooled, the top beds and front to be neatly tooled; dowel grooves to be cut in same to secure stone curb with dowels 3$\frac{1}{2}$″ × 1″ × 1″, provided and let in by the contractor.

GUIDE ROD STONES.

The guide rod stones to be 2′ × 2′ × 1′ 6″ thick, placed in the position shown on drawings; the beds and sides to be boasted, and the faces tooled to the radius of the tank; two bolt holes to be drilled in each stone to receive inch bolt.

FOOTSTEP STONES.

The footstep stones to guide rods to be 3′ 6″ × 2′ × 1′ 2″ thick, set in mortar on channel flags, as shown; the top and bottom beds and sides to be worked to plain

surfaces; two holes to be drilled in each stone for 1-inch bat bolts.

REST STONES.

The rest stones to be $2' 9'' \times 1' 6'' \times 1' 2''$ thick, truly bedded in the flags; the top and bottom beds and sides to be worked to a plain surface; the top bed of all the rest stones to be carefully worked to the same level as the top of the footstep stones.

THE CHANNEL.

The channel round bottom of tank to have good sound Haslinden or Rochdale flags, 7 feet 6 inches broad and 6 inches thick, to be jointed with cement, and the ends to be wrought to the thickness of two courses of brickwork, so as truly to bed upon 9 inches of brickwork on each side of channel. The inner upper face of each flag to be chamfered as shown in drawings.

SIDE STONES TO RECESS.

The recess for reception of inlet and outlet pipes to have two side stones $10' \times 1' \times 9''$ thick, secured to top and bottom flags with four iron cramps to each stone $4' \times 1'' \times 1''$, provided and let in by the contractor.

MOUND STONES.

The centre of mound to have a stone $5' \times 4' \times 1' 6''$ thick, also four stones $4' \times 1' 6'' \times 1' 6''$ thick, the whole truly bedded and fixed as required; four holes to be drilled in centre stone to receive bolts of column, the upper surfaces to be bedded, and the four side stones to be secured to centre one with eight dowels $8'' \times 1\frac{1}{2}'' \times 1''$, provided and let in by the contractor.

The mound to have on one side, where shown on plan, a stone $5' \times 5' \times 1' 6''$ thick, truly bedded and

fixed as required; the top bed to be boasted, and two holes to be drilled in same to receive bat holes to hold tie rods connecting outlet and inlet pipes.

STONE STRING.

The retaining wall to have a stone string $1' 5'' \times 9''$ thick, in lengths not less than 4 feet, grooved out on each side to receive dowels $4'' \times 1' \times \frac{1}{2}''$, provided and let in by contractor. The top and bottom beds and sides to be boasted, the face to be tooled, chamfered, and throated as per drawing.

STONE COPING.

The top of retaining wall to have a stone coping $1' 6'' \times 6''$ thick, in lengths of not less than 4 feet, to be tooled, chamfered, and throated as per drawing, cramped at all the joints, and run with lead.

MORTAR AND CEMENT.

The mortar and cement for setting the stonework will be found by the contractor.

PERIOD OF COMPLETION.

The stonework is to be delivered and set from time to time as soon as the brickwork is ready to receive it, and the contractor is to be prepared to commence setting stones within six weeks from the date of his tender being accepted; and in case of any delay to the works arising from any default or neglect of the contractor in being ready to proceed with the setting of any portion of the stonework when required to do so, he is to forfeit and pay to the company, damages, and the company may retain out of any sums arising due to the contractor ten pounds per week for each and every week the work shall be so delayed.

IX.—*Specification of* Water Stations *and* Cranes.

The standards and reservoirs to be 9 feet 6 inches above the foot of the stand-pipe, the reservoirs to hold 10,000 gallons imperial, and to be cast $\frac{5}{8}$ thick, and of mixed best metal (not cold blast); to be flanged and bolted inside with necessary wrought-iron bolts, to be supplied with rivets sufficient for jointing, and each reservoir with thirty extra bolts of hard wrought-iron tie rods to prevent any lateral thrust from the weight of the water. The water cranes to be of the best construction, with water way inside of pipe 7 inches in diameter, balanced on top of stand, and self acting. The valve or valve and seats to be of brass, fitted and formed to a water-tight joint, to be finished with connexion pipe and cover 18 feet from the nozzle of the crane, and the nozzle or mouth of the crane to be swung clear 9 feet 6 inches above the top of the rails; each crane to be furnished with a suitable nozzle pipe. The whole work to be painted three coats white or lead colour, as preferred.

X.—*Specification for* Bridge *over . Railway, on the Red Hill , belonging to the .*

CONDITIONS.

The contractor is to sign the drawings and specification, and to commence the work within one week after the day on which his tender is accepted, and the whole of the works are to be regularly carried on and entirely completed within four months from the date of commencement, under a penalty of *l.* per week for each

and every week during which the said works remain unfinished beyond that time.

The whole of the works executed under this contract shall be upheld and maintained, by and at the sole cost of the contractor, for a term of six months after their entire completion has been certified by the engineer.

No charge for any alleged extra works will be allowed, unless a written voucher sanctioning such work, and signed by the engineer to the company, be produced by the contractor.

PAYMENTS.

An instalment of an amount equal to 90 per cent. of the value of the work executed, or as near as can be ascertained by the engineer, will be paid to the contractor at the end of the second and each succeeding month after the commencement of the work, provided they shall have so progressed as before stipulated, but not otherwise, and the final balance will be paid at the expiration of six months after the certified completion of the works.

Tenders are to be delivered at
by eleven o'clock in the forenoon, on or before the day of , addressed to , and endorsed, "
Bridge. Tender of Works."

No tender will be received which is not in the proper form.

EARTHWORK AND EXCAVATION.

Excavate for the foundations to the depths and widths shown upon the drawings, or to such additional depth as may be required or directed.

All foundations to be level at the bottom, and any ground loosened below the required level to be removed, and the space made good with concrete. Level and well

ram down the earth after the bricks are laid, and finally clean and cart away where directed all superfluous earth and rubbish.

CONCRETE.

All concrete shall consist of good clean Thames gravel or other ballast of equal quality, mixed with a small quantity of clean sharp sand and fresh ground blue lias lime, in the proportion of four parts of gravel to one of sand and one of lime. The ingredients to be mixed in a dry state, and well beaten and worked together with a small quantity of water until they are thoroughly incorporated, and in this state shall be thrown into the foundations or other part of the work from a height of at least 10 feet.

All concrete to be carried up level throughout the space it is to occupy in courses not exceeding 12 inches in thickness, and finally brought to a perfectly level or smooth surface at the proper height or depth.

DRAINS.

The upper surface of abutments to be properly bevelled down to edge of drains shown on drawings as 9-inch half round glazed stoneware channel bedded in cement to be laid with sufficient fall towards centre of abutment, and to be connected with a vertical 6-inch glazed stoneware pipe built into pier, to correspond in every respect to drawing, and to be covered with loose stones, so as to leave a free passage for water.

Provide arched openings of the size marked on drawing in each pier as termination to vertical drain pipes at ground level.

BRICKLAYER.

The mortar to be composed of the best fresh-burnt Glynde, Merstham, or Dorking lime, and clean, sharp,

well-washed river sand, in the proportion of one of lime to two of sand. The mortar must be used fresh, and only a sufficient quantity mixed at one time for that day's consumption.

Wherever cement is used it shall be the very best Portland, mixed with an equal quantity of clean sharp river sand, and in small quantities as required for use.

ASPHALTE.

As soon as the girders and plates are fixed on the piers, and before the filling for the road has commenced, they shall be coated with Broughton's asphalte $\frac{3}{4}$ inch thick, laid on in two coats, each $\frac{3}{8}$ inch thick, the whole of the surface having been first thoroughly freed from dust and all other extraneous matter, and great care must be taken to make the connexions perfect between the abutments and the ironwork.

After the asphalte has firmly set, the surface to be covered over with brickbats, broken stones, &c., to a depth of 6 inches, carefully laid on so as not to break the coating, and the contractor will be responsible for making and maintaining the same water tight until the completion of the contract.

The facework of the bridge to be built in picked grey stock, from yards approved by the engineer, finished with a neat clean trowel joint; no joint to exceed $\frac{1}{4}$ of an inch in thickness, the whole to be well flushed in with mortar, and grouted with liquid mortar every second course. The brickwork to be carried up uniformly throughout, and to be built in the manner of old English bond.

Cut all plinths and chamfers that may be required, and build the pilasters over sailing courses, &c., in strict accordance with the detail drawings.

Build in all stone and ironwork that may be required.

STONEMASON.

The coping and caps to piers to be of Portland stone, worked according to details which will be provided.

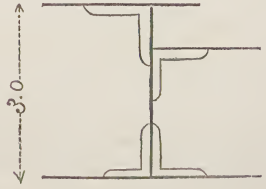
The imposts or bed stones to be of Bramley Fall or other approved stone of equal quality. All stone used to be of the very best quality, free from scales, vents, or marl holes, to be set and bedded in cement, with joints worked perfectly true, and in all cases to be laid on its natural bed.

IRONWORK.

This bridge is constructed of two wrought-iron main girders 3 feet deep, and thirteen cross girders 18 inches deep, and the whole surface covered with $\frac{5}{16}$-inch floor plates. Where the joints of these floor plates occur, a strip $6\frac{1}{4}'' \times \frac{3}{8}''$ bar is introduced on top, and $6'' \times 3'' \times \frac{1}{2}''$ T piece underneath for strengthening the same; at the sides of floor plates next the main girders an L iron $3\frac{1}{2}'' \times 3'' \times \frac{3}{8}''$ is riveted to ensure a good and strong connexion.

MAIN GIRDER.

These girders are 39 feet 6 inches long by 3 feet deep, and prepared for brick parapet by riveting on an intermediate flange of $6'' \times \frac{1}{2}''$ plate, as per sketch underneath.



The rivets to be $\frac{3}{4}$ inch diameter, and 4 inches pitch throughout.

CROSS GIRDERS.

One 26 feet long by 18 inches deep, L irons $3'' \times 3'' \times \frac{3}{8}''$. Web throughout rivets $\frac{5}{8}$ inch diameter and 4 inches pitch.

FLOOR PLATES.

The sizes of these plates are about $8'\ 8'' \times 2'\ 7'' \times \frac{5}{16}''$ thick. Great care must be taken in getting the joints a good fit; a strip of $6\frac{1}{4}'' \times 3'' \times \frac{1}{2}''$ is riveted on top of joints, and a T iron $6'' \times 3'' \times \frac{1}{2}''$ underneath, rivets $\frac{3}{4}$ inch diameter and 4 inches pitch.

In case the engineer shall deem it necessary to alter or deviate from any of these works described in the drawings or specifications, he shall be at perfect liberty to do so, without any alteration in or addition to the average price given by the contractor for this description of work.

The whole of the wrought iron used for the girders and flooring shall be of the best description, known as B. B. Staffordshire plates or bars, and shall be capable of sustaining a tensile strain of 20 tons per inch.

The engineer shall have full power to apply any test that he may deem necessary to the iron at the cost of the contractor.

All iron used for bolts and rivets shall be Low Moor.

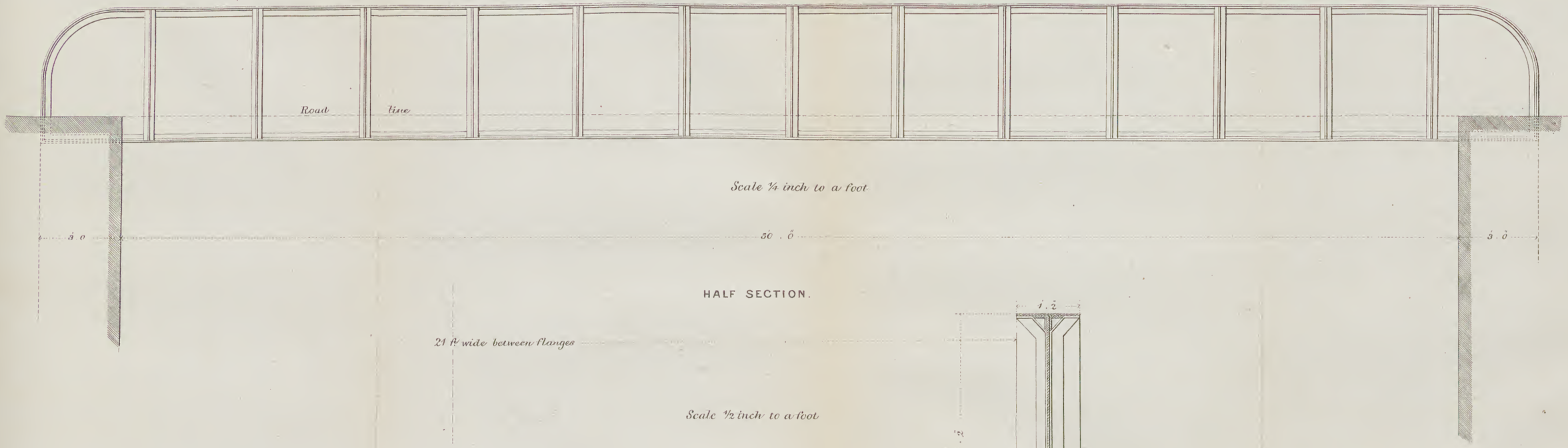
XI.—*Specification for* WROUGHT-IRON BRIDGE *proposed to be erected over the Wey at*

The bridge to have a span of 50 feet and a clear width of 21 feet, with kerbs,* as shown on the drawing, to separate the footways from the central space for carriages, &c. The main girders forming the parapet to

* *Curb*, or *Kerb*, used indiscriminately for curb-stone, curb-plate, curb to roofs, curb to well, &c.—J. B.

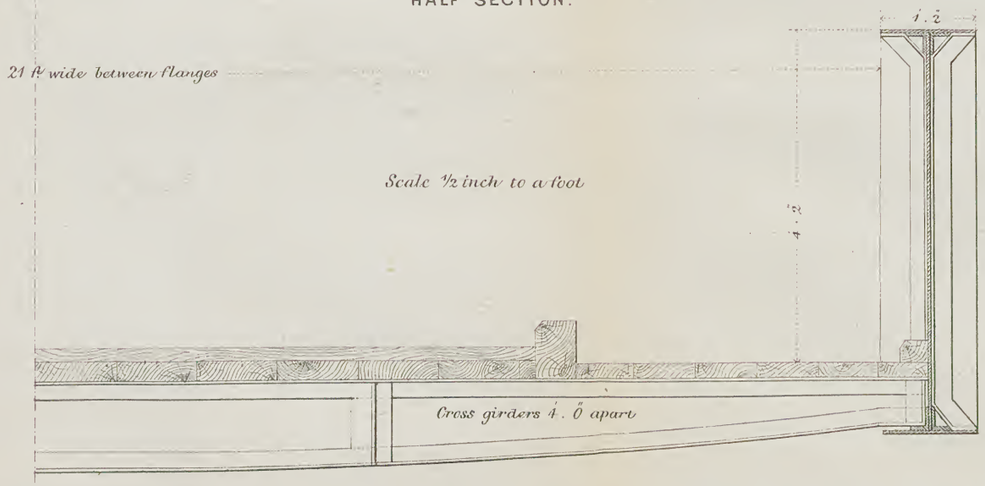
BRIDGE 50 FEET SPAN.

SIDE ELEVATION.



Scale ¼ inch to a foot

HALF SECTION.



Scale ½ inch to a foot

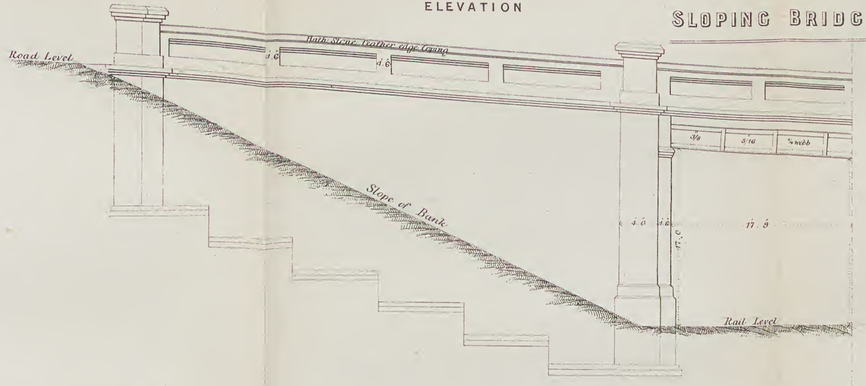
Newbery & Alexander, Lith.
45, Castle Street, Holborn.

E & F.N Spon 16. Bucklersbury, London.

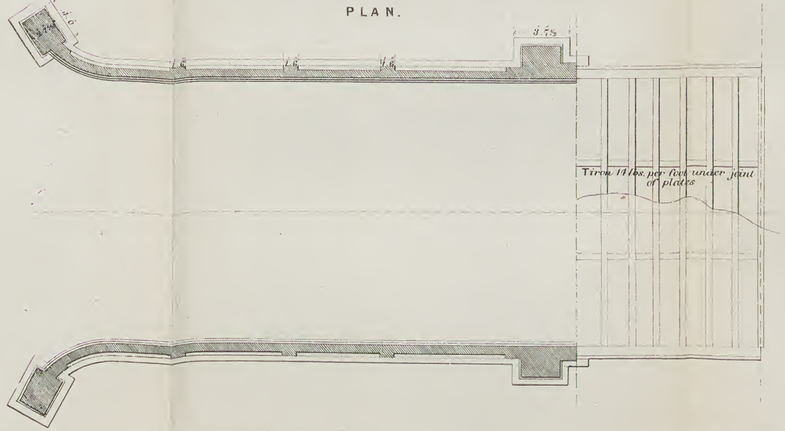
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SLOPING BRIDGE.

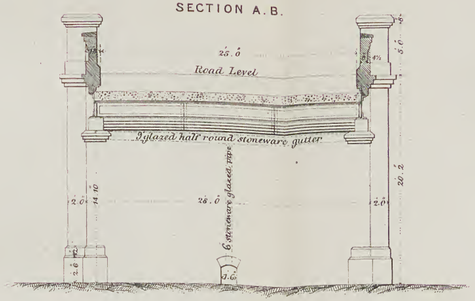
ELEVATION



PLAN.



SECTION A.B.



SCALE OF FEET



E & F N. Spon 16. Buckersbury London

VICTORIAN RAILWAYS
GENERAL LIBRARY

be not less than 4 feet 2 inches above the level of foot planking.

MAIN GIRDERS.

The main girders (one on each side) to be single webbed, of 56 feet long, and not less than 5 feet deep, with top and bottom plates of 1 foot 2 inches wide, and properly stiffened with angle iron and plates where required.

CROSS GIRDERS.

The cross girders to be placed at distances of 4 inches apart, centre to centre, and to have angle iron top and bottom; the web to be stiffened with angle iron where required, and to be securely attached to main girders with rivets and bolts.

ROADWAY.

The lower planking for carriage way to be 3 inches thick, and the upper planking and planking for footways of 2 inches thick, all of sound Memel timber.

The kerbs to be formed of timber 9″ × 6″, and to run the full length of the bridge.

The bridge to be of sufficient strength to carry with safety a load of 4 tons on the middle, or a load of 8 tons distributed over the whole length.

The whole of the iron to be of best Staffordshire, or other iron of equal quality.

XII.—*Specification for* Engine *and* Boiler.

Engine.—To be high pressure, and capable of lifting 6000 gallons per hour to a height of 116 feet. To be fitted with metallic double-ringed piston and expansion valve, wrought-iron crank shaft, fly wheel of suitable

weight, screw steam valve, pumps, pipes, cocks, &c., complete.

All joints to be fitted metal to metal, and all rods to be made of wrought iron.

Boiler.—To be cylindrical, not less than $\frac{3}{8}$ of an inch thickness, of good iron, with plates over fire, to be capable of sustaining four times the working pressure, assuming the same to be 45 lbs. to the square inch. To be fitted with man lid and cross bars complete, two safety valves with levers, guards, and weights, a blow valve, three gauge cocks and one float, blow-off cock and pipe, damper and frame, set of fire and bearing bars, two doors and frames for furnace and ash pit, one steam gauge and one water gauge, set of stoking irons, and spanners to all nuts.

Contractor to state description and power of engine (whether horizontal or vertical), size of boiler, and diameter of cylinder proposed.

The contract sum to include carriage and all expenses of fixing at , and keeping engine and boiler in repair and sound working order for one year; 25 per cent. to be retained for that period, or a satisfactory guarantee.

The engine and boiler to be fixed, and in complete working order, within six weeks of signing the contract, under a penalty of 1*l.* per day, if that period be exceeded.

Any brickwork required for fixing the engine will be found by the .

MODE OF PAYMENT.

Fifty per cent. when engine and boiler are fixed, and have been in satisfactory working one month; 25 per cent. at the end of three months, subject to the same conditions; balance as before mentioned.

XIII.—*Specification for* Pumps.

The pumps to be lifts, capable of raising not less than 4000 gallons per hour to the height of 116 feet above surface of water in well.

The barrels to be cast iron, and bored perfectly true; the joints to be fitted metal to metal; the valves to be discs with direct passages, equal to the area of the barrels; the valves to be fitted with gun-metal guards and seats; an air vessel to be attached to the pipe above the working barrels of six times the capacity of one stroke; a door to be fitted over each valve. The pumps and air vessels to be perfectly tight under a pressure of a 400-feet head; the rising main not to be of less diameter than the barrels; the rods to be fitted together with bored sockets and ends turned to fit, and secured by a cotter; the crank shaft to be made of wrought iron, to be turned perfectly true in all its bearings, to work in gun metal on a cast-iron frame, each rod to be fitted with a parallel motion; the crank shaft to be driven with spin wheel and pinion; the rods and pipes to be stayed every 10 feet by sound oak stages, and ends of stages inserted at least 20 inches into the side of the well, and fixed securely by means of brickwork laid in cement; the lower stage to be not less than 12 inches wide and 8 inches thick; the next three stages from bottom one to be not less than $12'' \times 6''$, the others $12'' \times 4''$, to be stayed so as to be perfectly steady. Every part of the pump to be of proper strength; the buckets not to travel more than 50 feet per minute.

State the length of stroke, diameter of the barrels, and number of pumps proposed.

The pumps to be fixed, and in complete working

order, within one month of signing the contract, under a penalty of 1*l.* per day, if that period be exceeded.

The water is feet from the surface of the ground, and it is proposed to place the pumps feet from the surface of the water.

The contract sum to include carriage, fixing, and all expenses, and keeping in repair and sound working order for one year; and 20 per cent. to be retained for that period, or a satisfactory guarantee.

Mem.—The soil of the well is .

MODE OF PAYMENT.

Fifty per cent. when the pumps have been fixed a month, and found in good working order; 30 per cent. at the end of two months, subject to the same condition; and the balance as before mentioned.

SECTION IV.—AGREEMENTS.

CONTRACTS, EXCHANGES, BUILDING, LETTING LAND ON BUILDING LEASES, LETTING FARMS, &c.

I.—*Heads of an Agreement between , of Park, in the County of , and Mr. , of , in the said County, Yeoman and Publican, for letting and hiring the Farm at , now in the occupation of Mr. , except a Field called , which he reserves.*

The farm contains about 88 acres, little more or less, with good dwelling-house, garden, yards, barns, stabling, cow-houses, granary, and all other requisite buildings. The farm to be taken as yearly tenant from Michaelmas, 1860.

The rent to be 138*l.*, payable quarterly if required, clear of all rates and taxes, including the land tax, which are to be paid by the tenant.

The tenant to keep and leave all the buildings, premises, gates, and fences, &c., in good and substantial repair, accident by fire and tempest only excepted, the landlord finding timber in the rough, bricks, tiles, slates, and lime for the same within ten miles of the said premises.

The tenant to keep all the hedges in good order and

repair, not cutting any hedge or any kind of underwood under eight* or above twelve years' growth, and always scouring out the ditches and drains, and making good the mounds and banks thereof.

To rear and preserve all young trees and timber, not cutting, lopping, or grubbing any tree under a penalty of 10*l.* over and above the value of the tree so cut, lopped, or grubbed, and not to crop any pollard under seven or above twelve years' growth.

Not to break up any pasture or old grass land under a penalty of 50*l.* per acre, nor to mow any such for hay twice in any one season, nor stock the same with heavy cattle in wet seasons, but to manure one-third part of such grounds as shall be mown for hay in each year in succession.

To cultivate, clean, manure, crop, and manage all the said lands in all respects in a good husbandlike manner, according to the most approved custom in the neighbourhood, not sowing two white straw crops successively on any part of the said lands (peas and beans properly hoed not considered as such), excepting that one-third part of the wheat stubble, if clean and fit, may be sown with oats or barley, but always to have at least one-fifth part under fallow. Turnips, cole seed, or vetches to be fed off by sheep on the lands, and one other fifth in clover ley, and never to plant more than two acres with potatoes in any one year.

To stack and embarn all the produce of the farm upon the premises, and to consume and spend all the hay and straw, chaff and fodder, upon the farm, excepting that one-half of the wheat straw may be sold off on condition of bringing back a load of good dung or other

* As applicable to young and well-kept hedges, this stipulation is unreasonable. See "British Timber Trees," by the Author. Article, "Hedges," &c., page 93. Routledge and Co. 1859.

manure, equal in value to such straw, for each load of wheat straw so sold off.

No sheep to be folded off the said farm, and particularly in the last year.

To spread and leave all the manure on the lands arising from or brought on the said farm, including that of the last year's crops, the tenant being allowed the use of the barns and yards and part of the stabling until the 1st of May, after the expiration of his tenancy, for the purpose of thrashing and marketing the said crops, and also for spending the straw, &c., unless the landlord or his succeeding tenant shall agree to purchase the said straw at its spending value.

Tenant not to underlet or part with the possession of the said farm, or any part thereof, without the written permission of the landlord.

Tenant not to sport, or allow any other person to sport, over the said farm without the consent of the landlord, who reserves the game and fish and all right of sporting to himself, friends, and keepers.

Landlord reserves all timber, plantations, bodies of pollards, stone, minerals, &c., with power to enter and to cut down, convert, dig, and cart away the same, also to plant on any part of the said lands, making compensation for the ground taken for such purposes.

Landlord or his succeeding tenant to be allowed to enter upon the fallows on the 1st of March, and on the clover leys by the 1st of September in the last year, in case the out-going tenant should refuse or neglect to plough and prepare the same in due season and in a proper manner, and to be allowed the use of part of the stabling and lodging room for the men from such time or times, and also to be allowed to take and cart out the dung and straw for litter for his horses, and also to sow grass seeds with the Lent corn in the spring of the last

year, to be harrowed by the out-going tenant gratis, who shall be bound also not to feed or turn into the said young seeds.

Tenant to settle with the out-going tenant for his ploughing and other acts of husbandry, clover, seed, &c., according to the custom of the country, and to be paid for the same by valuation whenever he shall quit the said farm.

I agree to take the farm at , now in the occupation of Mr. , on the preceding conditions and terms.

Witness my hand this day of , 1860.—

Witness,

II.—*Terms and Conditions for letting Farm, in the Parish of , in the County of , containing acres, or thereabouts.*

Except and reserved unto the landlord, his heirs and assigns, all timber and timber like trees, mines, minerals, and quarries, with all rights and royalties, together with all game and fish, with right of entry as well for sporting and fishing as for working, falling, and carrying away any such timber, stone, or minerals, making plantations, roads, or improvements, and exercising all other lawful rights of a landlord not hereby agreed to be demised.

Conditions to be observed on the part of the tenant, his executors, and administrators:

That the rent hereafter agreed upon, with the penalties herein specified, shall be paid quarterly, namely,

on the in each year, and the rent charge, as the same becomes due half yearly, to the respective parties entitled.

That he and they shall pay and discharge all taxes, rates, duties, and assessments now and hereafter to become chargeable on the said premises, except the land tax, chief rents, and landlord's property tax.

That he and they shall reside regularly upon the farm and cultivate the same, and shall not underlet or part with the possession of any part thereof without the landlord's consent in writing.

That he and they shall have only one-third part of the tillage under wheat in any one year, and that to be sown upon clean fallow, clover ley, or after a pulse crop.

That he and they shall keep up and leave regularly planted statute acres of hops; the poles to be properly stacked the year of quitting, and to be taken by the landlord or coming-in tenant at a fair valuation.

That he and they shall not plough up, or in any way convert to tillage or hop grounds, any pasture or meadow land, without the written consent of the landlord, under a penalty of 20*l.* per acre, and shall not crop or shred any timber or other trees (except pollards usually cropped for hop poles), and those only under the following restrictions: willow or sally of six years' growth, and others of ten years, under a penalty of 10*l.* for every tree so cropped or shredded; but the landlord shall be at liberty to reserve any trees (although the same may have been before cropped or shredded) which he may be desirous of retaining for ornament.

That he and they shall not sow two white straw crops in succession, but shall sow and leave in a proper state acres of red clover, which shall not be grazed

after the 15th day of October, and will allow the succeeding tenant to enter and plough on or after the 1st of November preceding his or their quitting.

That he and they shall assist in hauling for any new building, and shall load and haul to place, gratis, all materials for repairs and draining, and shall pay 5 per cent. interest on all draining; and further, shall do the hauling gratis (except turnpikes) of two waggon loads of coals from to every year, or do other hauling equivalent, at the option of the landlord.

That he and they shall keep and leave in good repair and order all gates, stiles, fences, ditches, drains, and watercourses, as well as glass windows, thatched buildings, and pumps—the landlord finding timber in the rough, and first putting the same in repair if required (the tenant presumed to be satisfied with such state of repair unless complaint be made in writing within three months after entering upon the farm)—and shall, moreover, keep the hedges annually trimmed and in good order, and shall, to the best of his and their ability, improve and preserve from injury by stock, ploughing or otherwise, all timber, saplings, first trees, orcharding, and plantations.

That he and they shall stack and lay on the said premises, and not elsewhere, all the hay, straw, roots, fodder, and stubble which shall grow or be made thereon, and all manner of manure arising therefrom shall be expended upon the said premises, under a penalty of 10*l.* for every ton or lesser quantity removed without the landlord's consent, to be considered in the nature of liquidated damages.

That he and they shall not suffer any trespass in respect to roads or game, all game, fish, and right of sporting as aforesaid being reserved, and to belong to the

landlord, and shall not suffer any person to sport or fish except the landlord, or those authorised by him; all trespassers in pursuit of game to be warned off, and proceeded against in the name of the tenant on being indemnified from all expenses.

That the lease to be executed between the said parties shall contain a proviso for making void the same in case of non-payment of rent within twenty-one days after the same shall have become due, or in case the tenant shall assign over his lease or underlet a part of the premises without the landlord's consent in writing, or in case the tenant shall make any assignments of his effects for the benefit of his creditors, or allow his goods to be taken in execution, or his body to be delivered in gaol for debt, or in case he shall become bankrupt or insolvent.

Conditions to be observed on the part of the landlord, his heirs or assigns, respectively:

That he and they shall pay and discharge the land tax, chief rent, and landlord's property tax, and will allow one-third part of the tillage for the off going, wheat-crop hedges and borders excluded, provided it has been sown as before stated, otherwise it will not be allowed to be reaped; and further, that the tenant shall thrash such off-going crop as follows: one-third by the 1st of December, one-third by the 1st of February, and the remaining one-third by the 1st of April, or the coming-on tenant to have full power to do so by taking care of the wheat for the off-going tenant.

That he and they will permit the tenant to have the use of part of the rick-yard, barn, and granary, except during the hop-picking, and also use of the house, except the kitchen and one bedroom, until the 1st day of May after the expiration of the tenancy; also part of the buildings, fold-yards, and one meadow until the said time to consume the hay and fodder.

That he and they will keep the repairs, except those before stated, and will agree that the seeds be paid for if sown upon a clean fallow.

That he and they will compensate the tenant for any damage done in standing corn or mowing grass by falling timber or hauling out of the usual roads, and will also allow for any land taken for planting or other improvements at the same price per acre as the land is valued to the tenant.

I, the undersigned, , of , in the county of , esquire, do hereby agree that I will at any time when required, execute at the joint expense of myself and the said , a lease, and I, the undersigned, , do hereby agree to accept and take a lease for the term of years from , terminable at the end of one year on either party giving six months' notice to the other of his intention to determine such tenancy of the Farm aforesaid, at the yearly rent of *l.*, and such additional rent by way of penalty as before mentioned, together with such further sum as shall represent the value of the tithe rent charge apportioned on the said farm, in lieu of great and small tithes to be paid as before mentioned, under and subject to the several terms, stipulations, and conditions before mentioned; and it is agreed that in the mean time, and until the said lease shall be made and executed, the said and his heirs shall have full power and authority to distrain for the said rents as the same shall become due and payable.

Dated this .

Signed by the said in the presence of .

III.—*Terms for Granting the Land belonging to* (*hereinafter called "The Vendor"*), *in the County of* , *part of the Manor of* , *to* , *hereinafter called "The Purchaser."*

First. The land comprised in this agreement (but reserving to the vendor all mines and minerals) is delineated in the plan at foot , and the dimensions are there specified. The purchaser may quarry stone out of the said land for the purpose of building thereon, but not for any other purpose.

Second. It is to be granted to the purchaser in fee, at an annual fee farm rent of , such annual fee farm rent to commence from the day of , and in consideration of a money payment of *l.* to be paid on the execution of this agreement.

Third. The vendor will within a fortnight from the date hereof have ready for delivery to the purchaser or his solicitor, at the office of , solicitors, , an abstract of the vendor's title, commencing with indentures of lease and release, dated the , but no deed or document prior in date to such indentures, whether recited or mentioned therein, or in any subsequent deed or document or not, shall be abstracted or produced, and all recitals, notices or statements of deeds and documents, matters or things contained in any deed or will or other instrument, dated upwards of thirty years ago, shall be received as conclusive evidence of such deeds and documents, statements, matters or things, and the vendor shall retain all deeds and writings, but will covenant for production thereof, and for furnishing attested copies thereof to the

purchaser at his expense, all conveyances and assignments of any outstanding estate, term, or interest, and any probate, administration, or document for that purpose, and all official attested and other copies or extracts, or from deeds, wills, registers, writings and muniments of title, or any other evidence whatsoever required for completing or verifying the abstract or otherwise, and all information respecting the matters aforesaid shall be sought for and obtained by and at the expense of the purchaser.

Fourth. That the deed of grant and a counterpart thereof, and all covenants for production of deeds, shall be prepared by the vendor's solicitors at the purchaser's expense, and shall be executed by the vendor and all other parties at the purchaser's expense, and shall be ready for execution on the completion of the messuage to be erected on the ground.

Fifth. That the deed of grant, and the counterparts thereof, shall contain covenants on the part of the purchaser, , as follows, viz. .

That no more than houses shall be erected on the land hereby contracted for.

That such houses shall be set back feet from the road fronting the same, and feet from the boundary wall of the land on each side, and shall be completed by day of .

That each house shall be of the original cost of *l.* at the least.

That the drawings of the external elevations of the houses, and also the gateways and railings in front of the houses, shall be submitted for approval to the architect or surveyor for the time being of the vendor.

That the fronts, backs, and sides of the houses shall be either of free stone or of the native stone, and the quoins and mullions of free stone or magnesian lime stone.

That the roofs shall be concealed or covered with slate.

That the boundary fences in front of the houses shall be a wall not exceeding 4 feet in height, with a pennant or free stone coping surmounted by an iron paling of an uniform pattern, and the gateway pillars shall be of ornamental designs in free stone or magnesian lime stone.

That the other boundary walls shall be good stone walls, not exceeding 6 feet in height, with a neat brick or stone coping. Such walls to be erected in the first place at the expense of the purchaser, but the vendor will covenant that the purchasers of the adjoining lots respectively shall repay the purchaser half the expense of erecting such walls.

That no building be erected in front or on the sides of the houses, and that no building shall be erected behind the same other than a hot-house or conservatory, or coach-house and stables; no such building shall exceed 20 feet in height from the ground, and any coach-house or stable shall be covered with slate.

That he will, at his own expense, make and complete the footway, 6 feet in width, and the roadway,
feet in width, in front of the land hereby contracted for.

That he will not erect, or permit to be erected, any steam-engine, or carry on or permit, or suffer to be carried on upon any part of the premises, the trade or business of a tavern-keeper, alehouse-keeper, or retailer of beer or any other liquors, or keeper of any place of public entertainment, tallow-melter, soap-boiler, brewer, distiller, butcher, slaughterman, lime-burner, farrier, founder, or smith, shopkeeper, or any noisome or offensive trade, business, or occupation whatever, and to keep all buildings which he shall erect in good repair,

and to insure them in a competent sum against damage by fire in the Insurance Office.

Sixth. That the purchaser shall be at liberty to carry one drain from each house, to be erected on the land hereby contracted for, into the main sewer, of a size and in a direction to be approved of by the vendor, and shall pay the vendor *l.* towards the costs of making the said main sewer, but shall not permit any other person, or the drain from any house standing on other land, to communicate therewith or pass through the said land without the consent of the vendor, and the vendor reserves to himself, his heirs, lessees, and assigns, the right of using such drain or drains, and of entry on the land for the purpose of cleansing and repairing such drain or drains, and of forming a communication between the same and any drain or drains made, or which may hereafter be made, in any of the other lands of the vendor.

Seventh. That the purchaser shall, within four weeks after the day on which the abstract of title shall be ready for delivery, as aforesaid, at his own expense, state in writing to his objections to or requisitions in respect of the title, and all objections and requisitions not made and delivered in the manner and within the period aforesaid shall be considered to have been waived. In case the vendor or his solicitor shall be either unable or unwilling to remove or comply with any objection or requisition which shall be duly taken or made by the purchaser in the manner and within the period aforesaid, it shall be competent to the vendor, at any time after the receipt thereof (and notwithstanding any attempt may have been made to remove or comply with the same), to rescind this agreement by giving notice in writing to the purchaser or his solicitor and returning the money payment made by the purchaser,

but without liability for interest, costs, expenses, or any other claim on the part of the purchaser.

PLAN REFERRED TO IN THE FOREGOING AGREEMENT.

Note.—Here insert a plan of the ground, with the roads and dimensions of the plot to be conveyed carefully shown, and the dimensions accurately figured. The names of adjoining owners and lessees should be also written on the map, the points of the compass indicated, and a scale affixed.

I hereby agree with , the agent of the said , to accept a grant of the land described in the plan above laid down on the foregoing terms, and to execute a counterpart thereof, and do engage in all respects and things to comply with the terms above specified. As witness my hand this day of , one thousand eight hundred and .

I, the undersigned , agent for and on behalf of the said , hereby agree that the said shall execute a grant of the land described in the plan above laid down on the foregoing terms, and in all things comply with the terms on his part above specified. As witness my hand this day of , one thousand eight hundred and .

IV.—*An Agreement for letting small Cottage Allotments to several Tenants.*

We, the undersigned, individually and severally, hereby acknowledge that we take and hold the piece of ground containing the quantity and numbered on the plan annexed, with the number against which our names or marks are respectively affixed, as tenants at

will of , Esq., at the yearly rent or price of per pole or perch, to include the tithes, rates, and taxes on the said land, under and subject to the following rules, stipulations, and covenants, without any exception or qualification.

We agree to pay the said rent on or before the 29th day of September in each and every year, though to be due and payable quarterly if required.

To keep the said land in a clean and good condition, and manure on half in each year in succession.

Not to use any horse labour in the said land, but to cultivate the ground by the spade and manual labour only.

Not to sow or plant more than one half of the said ground in any one year with wheat or potatoes.

Not to work on the said ground before five o'clock in the morning or after nine o'clock in the evening between the 25th day of March and the 29th day of September, and not before six o'clock in the morning or after seven o'clock in the evening between the 29th of September and the 25th of March.

Not to work on Sundays.

Not to trespass on any neighbour's allotments, and if convicted of any legal offence, or proved to have wilfully injured or damaged any neighbour's crop or ground, the tenancy of the ground, with the crops thereon, to be immediately forfeited.

To assist in keeping the pathways between the several allotments in good order and repair.

Not to underlet the said ground, or any part thereof, without written consent.

Not to bring any horse or donkey, dogs, or other animals, on the said ground, except a horse or donkey (muzzled) for the purpose of bringing manure or removing produce.

To give always two months' notice at least of our in-

tention to give up any piece of ground, and in that case the rent for the current year to be paid before the crops are removed.

If the ground should be without any crops, or any proper preparation for a crop, the same shall be forfeited at any time after the 20th day of March, and the landlord to be at full liberty to take possession and keep the said ground or relet the same.

Note.—Here follow the schedule of the numbers on the map, the tenants' names being written opposite, and the map afterwards marked with the numbers and rent of each piece, and the pieces, if necessary, distinguished by different colours.

V.—*Agreement for building a* House *and* Premises *according to Plans and Specifications provided by*

Memorandum of agreement made this day of , one thousand eight hundred and , between on the one part, and builder on the other part.

Witnesseth, that the said doth hereby, for himself, his executors or administrators, covenant and agree to and with the said , that he, the said , his executors or administrators, shall and will, at their own proper cost and charges, execute in a substantial and workmanlike manner effectually and duly the whole of the works required to be done in the said dwelling-house, according to the drawings and specifications thereof, and signed by the said , and according to the general conditions appertaining thereto, for the price or sum of of lawful money of Great Britain, and shall and will at the like cost and charges provide all the stone, lime, brick,

timber, slates, lead, iron, glass, and all other materials for the said works of the qualities, dimensions, and descriptions mentioned in the said specifications, and subject to the conditions and stipulations therein contained.

And the said , in consideration of the due and faithful performance of the covenants and agreements hereinbefore referred to on the part of the said , his executors and administrators, doth promise and agree that the said sum of shall be paid to him in the manner following; that is to say, one-fourth of the said sum when the brickwork has been carried up to the level of the eaves; one-fourth when the roof is covered, chimneys carried up and completed, and the carpenter's work complete; one-fourth when the joiner's work, glazier's work, plumber's work, drainer's work have been completed;. and the last instalment of one-fourth two months after the whole of the works shall have been rendered up complete.

The whole of the work to be completed on or before the day of now next ensuing, under a penalty of 40*l.* as and for liquidated damages.

Provided always, that should any penalty be incurred as aforesaid by the said , under the terms and conditions specified in the before-mentioned specifications, it shall be lawful for the said to deduct and retain the same from and out of the said sum of , or so much of the same as may at the time remain unpaid.

In witness whereof, the said parties to these presents have hereunto set their hands and seals on the day and year first above written.

Signed, sealed, and delivered in the presence of

VI.—*An Agreement made the eighteenth day of May, one thousand eight hundred and sixty-three, between , of , in the Isle of , Builder, hereinafter called the Contractor, and the hereinafter called the Proprietors.*

The contractor, for himself and his heirs, executors and administrators, hereby covenants and agrees with the proprietors and their successors and assigns, that for the considerations hereinafter mentioned, he will within the space of four calendar months from the date hereof, erect, build, and complete upon that part of the land of the proprietors at , in the of and county of , which constitutes Lot 11 on the published plans of their estate, called , a villa according to the specification and the plans which are respectively marked A, B, C, D, E, F, G, H, and I, and signed by the contractor, and bearing even date herewith, in a good workmanlike and substantial manner, and to the satisfaction of Mr. , of street, London, surveyor, hereinafter called "the surveyor;" and will or shall find and provide such good materials of all kinds as shall be proper and sufficient for erecting the said villa and completely finishing the said works; and will or shall maintain and keep the same in good and perfect order and condition for the space of six calendar months next after the completion thereof, to be certified as hereinafter provided.

And it is agreed between the parties hereto, that if the contractor, or his executors or administrators, shall in the opinion of the surveyor be guilty of any neglect or delay in building and finishing the said villa and works as aforesaid, or in the progress thereof, and the

surveyor shall certify the same by writing under his hand, or if the surveyor shall certify as aforesaid, that he is dissatisfied with either the manner in which or the materials with which the contractor, or his executors or administrators, is executing the works, it shall be lawful for the proprietors, or their successors or assigns, without any previous legal proceedings, or any other authority than this, and without affecting any right or remedy which they would or might otherwise have upon or in respect of this contract, or any security for the performance thereof, forcibly to expel, eject, and remove the contractor, or his executors or administrators, and all other persons, from the premises, and to take possession of and retain permanently for their own use all materials and implements thereon, and to employ any other person or persons to build or finish the erection of such villa and works as aforesaid, on such terms as the proprietors may think fit; and that the proprietors, or their successors or assigns, may and shall deduct and retain all such sums of money as they shall pay for the completion of such villa and works from and out of the money which shall be due to the contractor, or his executors or administrators, under this agreement; and that the contractor will not, and his executors or administrators shall not, do or cause to be done any act, matter or thing whatsoever, to hinder or molest the proprietors, or their successors or assigns, or any person or persons employed by them, in completing and finishing the said villa and works as aforesaid, or in using the materials which shall be on the premises; and that if from any cause (other than continued rain or frost) the said villa and works shall not be completed within the said period of four months from the date hereof to the satisfaction of the surveyor as aforesaid, the contractor, or his executors or administrators, shall on demand pay

to the proprietors, or their successors or assigns, the sum of 2*l.* for each day during which the same works shall remain incomplete, as stipulated damages, and not by way of penalty, 2*l.* per day being the amount which the parties hereto (to avoid litigation) have now ascertained and agreed to be a reasonable compensation to the proprietors, if the contractor shall fail to complete the works within the time limited for that purpose, but this provision is not to affect the right of the proprietors to take possession of and finish works themselves under the provision for that purpose hereinbefore contained. And the proprietors do hereby for themselves, and their successors and assigns, covenant and agree with the contractor, and his executors and administrators, that they, the proprietors, will, or their successors or assigns shall, pay unto the contractor, or his executors or administrators, for the erection and completion of the said villa and works, the price or sum of one thousand and thirty-five pounds sterling, in manner following; that is to say, one-fourth part thereof when and as soon as the surveyor shall by writing under his hand certify that the brickwork has been carried up to the level of the eaves; another fourth part when he shall certify that the roof has been covered and the chimneys carried up and completed, and the carpenter's work also completed; another fourth part when he shall certify the joiner's work, glazier's work, plasterer's work, plumber's work, and slater's work have been completed; one-eighth part when he shall certify that the whole of the works have been properly completed; and the remaining one-eighth part of the said price shall remain in the hands of the proprietors, and shall be retained by them during the period of six calendar months next after the date of the last of the said certificates, and until the surveyor shall certify as aforesaid that all defects which prior to or

during the said period of six calendar months, or during the repairs next mentioned, shall have become apparent, have been fully repaired and made good to his satisfaction, and shall then be paid to the contractor, or his executors or administrators.

And it is hereby further agreed, that in case the proprietors, or their successors or assigns, or the surveyor on their behalf, shall by writing direct any more work to be done than is set forth in the said plans and specification, or is reasonably to be inferred therefrom, the same is to be forthwith done by the contractor, or his executors or administrators, and the proprietors, or their successors or assigns, shall pay to the contractor, or his executors or administrators, so much money as such extra works and the materials used therein shall amount to, such amount to be ascertained and certified in writing by the surveyor, whose certificate under his hand is to be conclusive between the parties hereto, but no extra or additional works are to be done or (if done) paid for unless a written order for the same shall have been given by the proprietors, or their successors or assigns, or by the surveyor, before the execution thereof; and that if it should be thought proper by the proprietors, or their successors or assigns, or by the surveyor on their behalf, to diminish or omit any part of the work set out or implied in such plans and specifications, and they or he shall by writing desire the same to be omitted, then the contractor, or his executors or administrators, shall accordingly omit to do such works, and shall deduct and allow so much money as the work so to be diminished or omitted shall amount to, such amount to be ascertained as last aforesaid, and it shall be lawful for the surveyor by writing as last aforesaid, to certify that any of the said instalments should be either increased or decreased in respect of such extra or diminished or omitted

works as aforesaid, and in such case the instalment or instalments in question shall be increased or diminished accordingly; and in case such extra or additional work shall be required, one day of extra time shall be allowed to the contractor for every five pounds in value of such work, and a corresponding reduction shall be made in the time in the event of such diminution or omission of the works being required.

And it is agreed that in determining the value of any extra or additional works, or any diminished or omitted work as aforesaid, the same shall be estimated according to the schedule of prices annexed to the said specification so far as the same schedule extends, and that if any work shall be mentioned in the specification and not drawn upon the plans, or drawn upon the plans and not mentioned in the specification, such work is to be executed as fully and effectually as if it were described and included in both, and should any workmanship or materials be wanted which are not denoted in the specifications or drawings, but which are, nevertheless, necessary for the proper carrying out of the obvious intention thereof, the contractor is to provide the same in the same manner as if they had been particularly described or delineated; and in order to avoid litigation or disputes in respect of the premises, it is hereby expressly declared and agreed, by and between the parties hereto, that the certificate of the surveyor, as aforesaid, shall in every case be deemed a condition precedent to the right of the contractor, or his executors or administrators, to be paid any sum of money upon or by virtue of this contract, or otherwise, in respect of the works hereby agreed to be done, or any such additional or extra works as aforesaid, and that every such certificate shall be binding and conclusive upon and against both parties, and that no money shall become

due or payable from the proprietors, or their successors or assigns, in respect of anything herein contained or referred to otherwise than upon and by virtue of, and in conformity with, such certificate as aforesaid.

And it is further agreed between the parties hereto, that if the said , or any other surveyor for the time being authorised to act in the execution of the powers and duties hereby conferred and imposed upon the said , shall die or become incapable, or neglect so to act, then, and in every such case, the proprietors shall appoint another surveyor to execute such of the said powers and duties as shall then remain to be exercised, and every such surveyor so appointed shall have the same powers and duties as the said or other the surveyor so dying, or becoming incapable, or neglecting as aforesaid, and shall and may execute the same as fully and effectually to all intents and purposes as if such newly-appointed surveyor had been originally named herein instead of the said , but without prejudice to anything which the said , or any other such surveyor, as aforesaid, shall have lawfully done in the premises.

In testimony whereof the proprietors affix their seal, and the contractor subscribes his name and affixes his seal.

Signed, sealed, and delivered by the contractor in the presence of .

VII.—*Copy of Agreement for Exchange, &c., between the . and the on their Estate.*

An agreement made on the day of , 18 , between the , incorporated by

Royal Charter, hereinafter called "the asylum," of the one part, and the , hereinafter called "the company," of the other part. Whereas the asylum is seized in fee simple, in possession free from encumbrances, of the lands delineated and coloured pink in the plan annexed to these presents, which lands are situate at , in the parish of , in the county of , and the company are seized in fee simple, in possession free from encumbrances, of the lands delineated and coloured green on the said plan, which lands are also situated at , aforesaid, and adjoin the said lands of the asylum; and whereas the brook shown on the said plan flows over the said lands of the company, and from thence over the said lands of the asylum, and there are on the said lands of the asylum two weirs across the said brook for the supply of water to a water-wheel and for other purposes, the effect whereof is to head up the water of the brook to the injury of the said lands of the company, now it is hereby agreed between the said parties hereto, that—

1. The asylum, their successors or assigns, shall forthwith grant and assure to the company, their successors or assigns, the two pieces of land containing respectively 3 roods and 36 perches and 3 perches, distinguished on the said plan by a dark pink colour, for an estate, in fee simple, in possession free from encumbrances.

2. The company shall at the same time grant to the asylum, in exchange for the said two pieces of land containing respectively 3 roods 36 perches and 3 perches, the two pieces of land containing respectively 1 rood 36 perches and 2 roods 3 perches, distinguished on the said plan by a dark green colour, for an estate, in fee simple, in possession free from encumbrances, and shall, on the execution and performance by the asylum of the

conveyance and works hereinafter agreed to be executed and performed, pay to the asylum the sum of , and shall, before the 1st day of June next, erect, and for ever after maintain within the boundary of the lands to be respectively retained and taken by the company as aforesaid, a good and sufficient fence, so as to separate the same lands from the lands to be respectively retained and taken by the asylum, the line of division of the said lands being shown by a line from the point B to the point C on the said plan.

3. The company have made a new channel for the said brook from the point A to the point D on the said plan, and shall, before the said 1st day of June, continue such new channel to the point E on the said plan in the course shown by red lines, and fill up and make good the present channel between the point A and the said division line B C; and the company may at any time divert the brook in the remaining part of its course through their lands in the direction shown by red lines from the point E to the point F on the said plan, or in any other direction through their land.

4. The company, their successors or assigns, shall, before the said 1st day of June, remove the said weirs and water-wheel, and clear out the bed of the said brook, and trim and slope the banks thereof throughout the whole or such parts as require to be cleared out, trimmed, and sloped off, its course over the remaining lands of the asylum, and the lands to be taken by them in exchange as aforesaid, so as to leave a clear passage for the water throughout the whole course of the brook over the said remaining lands, and lands taken in exchange, of the clear width of 6 feet in every part down to the level of a line drawn through the middle of the course of the brook at a regular slope from the sill of the weir on the land of the , at the point marked G on the said plan, to the bed of the

brook at the said point marked D on the said plan, such bed being at that point about 2 feet above the said sill of the weir on the land of the ,
and to be marked by two sills laid across the new course of the brook near to the said point D, one on the land of the company, and the other on the land of the asylum; all which works shall be executed to the satisfaction of the surveyor of the asylum, and the materials of the said weirs and water-wheel so to be removed shall be left for and taken by the said asylum. Provided always that nothing herein contained shall be held to require any alteration to be made in the bridge over the said brook in its present position, as shown on the plan. And the asylum shall at all times thereafter keep the bed of the said brook throughout its course over the lands now held by the asylum, and the lands to be taken by them in exchange as aforesaid, so as to preserve a passage for the water of the width and depth aforesaid, clear of all obstructions.

5. The company shall indemnify the asylum, their successors and assigns, against all claims, demands, actions, suits, and proceedings which may be made, prosecuted, or taken against the said asylum, or the trustees in whom the property thereof was formerly vested, by reason or in consequence of the execution of the works hereby agreed to be executed, or in any matter relating thereto.

6. Inasmuch as the titles both of the said lands of the asylum and of the company respectively were investigated by counsel upon the occasion of the purchase thereof respectively, neither the said asylum nor the said company shall be required to furnish to the other any evidence of the title prior to the conveyances of the lands respectively to the asylum (or their former trustees) and the company, and no objection, requisition, or inquiry shall be made by either party as to the

prior title to the said lands respectively; each party shall retain the title deeds now in their respective hands, and covenant with the other party in the usual way for the production and furnishing copies or abstracts thereof.

In witness whereof the said parties have hereunto caused their common seals to be set.

Seal of (*L.S.*)

VIII.—*Bond.*

Know all men by these presents, that we, , of , and each two of us respectively, are jointly and each one of us severally held and firmly bound to , in the sum of , to be paid to , or their successors, or their certain attorney or attorneys, for which payment to be well and truly made, we, the said , do jointly bind ourselves and our heirs, executors, and administrators; and each two of us do jointly bind themselves and their heirs, executors and administrators, and each one of us, separately and apart from the others, doth bind himself and his heirs, executors and administrators, is firmly by these presents sealed with our seals, and dated this day of , one thousand eight hundred and .

The condition of the above written bond is such, that if the said shall well and truly observe, perform, fulfil, and keep all the agreements, stipulations, provisions, matters and things on his part to be observed, performed, fulfilled, and kept, respectively contained in or mentioned and referred to by a certain contract in writing, dated on the same day as the above

written bond, and made between the said of the one part, and the said of the other part, being an agreement for the erection and completion by the said of certain at , then the above written bond shall be void, but otherwise shall remain in full force.

Signed, sealed, and delivered by the above named , in the presence of C. D., E. F., G. H.

(Signed) A. B.

IX.—*An Agreement made the ninth day of September, one thousand eight hundred and sixty-two, between . , of , Builder, hereinafter called the Contractor, and . , hereinafter called the Proprietors.*

The contractor, for himself and his heirs, executors and administrators, hereby covenants and agrees with the proprietors, and their successors and assigns, that for the considerations hereinafter mentioned he will, within the space of four calendar months from the date hereof, erect, build, and complete upon that part of the land of the proprietor at , in the county of Kent, which constitutes lots and on the published plans of their estate, called , two dwelling-houses, with offices, according to the specification and the plans, sections, and elevations which are respectively marked A, B, C, D, E, and F, and signed by the contractor and bearing even date herewith, in a good workmanlike and substantial manner, and to the satisfaction of Mr. , of , London, surveyor, hereinafter called "the surveyor;" and will or

shall find and provide such good materials of all kinds as shall be proper and sufficient for erecting the said dwelling-houses and buildings and completely finishing the said works; and will or shall maintain and keep the same in good and perfect order and condition for the space of six calendar months next after the completion thereof, to be certified as hereinafter provided.

And it is agreed between the parties hereto, that if the contractor, or his executors or administrators, shall in the opinion of the surveyor be guilty of any neglect or delay in building and finishing the said dwelling-houses and works as aforesaid, or in the progress thereof, and the surveyor shall certify the same by writing under his hand, or if the surveyor shall certify as aforesaid, that he is dissatisfied with either the manner in which or the materials with which the contractor, or his executors or administrators, is executing the works, it shall be lawful for the proprietors, or their successors or assigns, without any previous legal proceedings, or any other authority than this, and without affecting any right or remedy which they would or might otherwise have upon or in respect of this contract, or any security for the performance thereof, forcibly to expel, eject, and remove the contractor, or his executors or administrators, and all other persons from the premises, and to take possession of and retain permanently for their own use all materials and implements thereon, and to employ any other person or persons to build or finish the erection of such houses and works as aforesaid, on such terms as the proprietors may think fit; and that the proprietors, or their successors or assigns, may and shall deduct and retain all such sums of money as they shall pay for the completion of such dwelling-houses and works from and out of the money which shall be due to the contractor, or his executors or administrators, under this agreement; and that the contractor will not, and

his executors or administrators shall not, do or cause to be done any act, matter or thing whatsoever, to hinder or molest the proprietors, or their successors or assigns, or any person or persons employed by them, in completing and finishing the said dwelling-houses and works as aforesaid, or in using the materials which shall be on the premises; and that if from any cause (other than continued rain or frost) the said houses and works shall not be completed within the said period of four calendar months from the date hereof to the satisfaction of the surveyor as aforesaid, the contractor, or his executors or administrators, shall on demand pay to the proprietors, or their successors or assigns, the sum of two pounds for each day during which the same works shall remain incomplete as stipulated damages, and not by way of penalty, two pounds per day being the amount which the parties hereto (to avoid litigation) have now ascertained and agreed to be a reasonable compensation to the proprietors, if the contractor shall fail to complete the works within the time limited for that purpose, but this provision is not to affect the right of the proprietors to take possession of and finish works themselves under the provision for that purpose hereinbefore contained. And the proprietors do hereby, for themselves and their successors and assigns, covenant and agree with the contractor and his executors and administrators, that they, the proprietors, will, or their successors or assigns shall, pay unto the contractor, or his executors or administrators, for the erection and completion of the said houses and works, the price or sum of five hundred and thirteen pounds fourteen shillings sterling, in manner following; that is to say, one-fourth part thereof when and as soon as the surveyor shall by writing under his hand certify that the brickwork has been carried up to the level of the eaves; another fourth part when he shall certify that the roof has been covered and the

chimneys carried up and completed, and the carpenter's work also completed; another fourth part when he shall certify that the joiner's work, glazier's work, plasterer's work, plumber's work, and slater's work have been completed; one-eighth part when he shall certify that the whole of the works have been properly completed; and the remaining one-eighth part of the said price shall remain in the hands of the proprietors, and be retained by them during the period of six calendar months next after the date of the last of the said certificates, and until the surveyor shall certify as aforesaid that all defects, which prior to or during the said period of six calendar months, or during the repairs next mentioned, shall have become apparent, have been fully repaired and made good to his satisfaction, and shall then be paid to the contractor, or his executors or administrators.

And it is hereby further agreed, that in case the proprietors, or their successors or assigns, or the surveyor on their behalf, shall by writing direct any more work to be done than is set forth in the said plans and specification, or is reasonably to be inferred therefrom, the same is to be forthwith done by the contractor, or his executors or administrators, and the proprietors, or their successors or assigns, shall pay to the contractor, or his executors or administrators, so much money as such extra works and the materials used therein shall amount to, such amount to be ascertained and certified in writing by the surveyor, whose certificate under his hand is to be conclusive between the parties hereto, but no extra or additional works are to be done or (if done) paid for unless a written order for the same shall have been given by the proprietors, or their successors or assigns, or by the surveyor, before the execution thereof; and that if it should be thought proper by the proprietors, or their successors or assigns, or by the surveyor on their behalf, to diminish or omit any part of the work set out or im-

plied in such plans and specifications, and they or he shall by writing desire the same to be omitted, then the contractor, or his executors or administrators, shall accordingly omit to do such works, and shall deduct and allow so much money as the work so to be diminished or omitted shall amount to, such amount to be ascertained as last aforesaid, and it shall be lawful for the surveyor by writing as aforesaid to certify that any of the said instalments should be either increased or decreased in respect of such extra or diminished or omitted works as aforesaid, and in such case the instalment or instalments in question shall be increased or diminished accordingly; and in case such extra or additional work shall be required, one day of extra time shall be allowed to the contractor for every five pounds in value of such work, and a corresponding reduction shall be made in the time in the event of such diminution or omission of the works being required.

And it is agreed that in determining the value of any extra or additional works, or any diminished or omitted work as aforesaid, the same shall be estimated according to the schedule of prices annexed to the said specification, so far as the same schedule extends; and that if any work shall be mentioned in the specification and not drawn upon the plans, or drawn upon the plans and not mentioned in the specification, such work is to be executed as fully and effectually as if it were described and included in both, and should any workmanship or materials be wanted which are not denoted in the specifications or drawings, but which are, nevertheless, necessary for the proper carrying out of the obvious intention thereof, the contractor is to provide the same in the same manner as if they had been particularly described or delineated; and in order to avoid litigation or disputes in respect of the premises, it is hereby expressly declared and agreed by and between the parties hereto,

that the certificate of the surveyor as aforesaid shall in every case be deemed a condition precedent to the right of the contractor, or his executors or administrators, to be paid any sum of money upon or by virtue of this contract or otherwise in respect of the works hereby agreed to be done, or any such additional or extra works as aforesaid, and that every such certificate shall be binding and conclusive upon and against both parties, and that no money shall become due or payable from the proprietors, or their successors or assigns, in respect of anything herein contained or referred to, otherwise than upon and by virtue of and in conformity with such certificate as aforesaid.

And it is further agreed between the parties hereto, that if the said , or any other surveyor for the time being authorised to act in the execution of the powers and duties hereby conferred and imposed upon the said , shall die or become incapable, or neglect so to act, then and in every such case the proprietors shall appoint another surveyor to execute such of the said powers and duties as shall then remain to be exercised, and every surveyor so appointed shall have the same powers and duties as the said , or other the surveyor so dying or becoming incapable, or neglecting as aforesaid, and shall and may execute the same as fully and effectually to all intents and purposes as if such newly-appointed surveyor had been originally named herein instead of the said , but without prejudice to anything which the said , or any other such surveyor as aforesaid, shall have lawfully done in the premises.

In testimony whereof, the proprietors affix their seal, and the contractor subscribes his name and affixes his seal.

SECTION V.—REPORTS ON VARIOUS WORKS INTENDED TO BE EXECUTED.

I.—For Messrs. and .

Report on the Purchase of Mr. 's Property,

June 24, 1862.

Dear Sir,

Mr. having made an offer of his property at to the for the sum of 3150*l.*,* I feel it my duty to lay before you some remarks on this subject, not relating to what I think is the value of the estate, but to the importance of acquiring it, if possible, for the purposes of the company, for it would enable them not only to lay out the Farm to far greater advantage, but would be the means of improving Estate to even a greater extent.

As I must enter into some details, and as my descriptions may appear somewhat discursive, I can only claim your patient hearing on the grounds that I have a great

* If this price appear high, it should be considered that when he purchased that portion on which his house stands, comprising about $1\frac{1}{2}$ acre, he paid 1500*l.* for it in a very dilapidated state, being an old tan-yard. In planting, building, and making paths and roads, he has been at very considerable expense, and will naturally seek some profit on the purchase and some remuneration for the outlay in bringing the grounds to their very pleasing, neat, and flourishing appearance, although these improvements might be of little real value to the company.

desire to put the matter in its proper light before you, and have only limited time to devote to this purpose.

For reference, and to render my remarks intelligible, I have appended a plan showing Farm, Mr. 's property, the Estate, now to be sold, and the estate , including and detached pieces. I have tinted the estates with different colours to render them more distinct. This plan shows, at a glance, the comprehensive, varied, compact, and valuable character of the property viewed as a whole.

On looking over a map of the country round , a person is at once struck with the very irregular and confused manner in which the public roads at the time they were made were laid out. They were apparently only farm roads, afterwards converted into public roads without any system, when the exigencies of the locality required the alteration. There are plenty of them, it is true, but they appear to lead nowhere; therefore, in setting out new roads, it becomes important to give them a better character, leading them from distant points in tolerably direct lines, so that they may have the appearance of being public roads of some importance, of real use in the locality, while they cut up the property to the greatest advantage to the company. This has been attempted on , and the additional portion more recently purchased, called , enabled us still farther to improve the estate on the principles laid down. When estates are small, roads cannot always be thus laid out. I feel quite sure that the Estate, which is treated in this manner, will be increased in value, and if the company had possession of Mr. 's property and a portion of the , the present laying out of the roads could be still greatly improved. It is not so much in

the road making as in the drainage that we shall be able to improve both and Estates by the purchase of the property from Mr. , as the company would then have the command of the river (which is the natural outfall for all the drainage in the district) from the point marked A to that marked B on the plan. Between these points there is a fall of not less than 15 feet, but at present the water is kept up by weirs at the points C D, and by invert arches under the railway culvert E and the road bridge F. On the purchase of the property in question the company could pull down the weirs, and so get rid of those obstructions, and the others may be overcome by a simple and inexpensive expedient, which I will describe before closing this paper.

On Estate there is a marsh land to be drained, and this we can do effectually to a certain depth, but the small amount of fall precludes the hope that we can ever render it good building property, for, however well we may drain it to the depth of 3 feet, the water below we cannot (by means at our command at present) get rid of; and yet if thoroughly laid dry by deep drainage, which would cost but a trifle more than the comparatively shallow drainage we are compelled to use, this part of the estate would at once become, if not more valuable, as valuable as any on the estate, and be especially well adapted for shops and places of business. For want of sufficient fall in the river, in consequence of the weirs, the invert arches, and the obstructions to the progress of the water occasioned by the crooked and sinuous course of the stream, it is often flooded after heavy rains, and as the water cannot get away, from the causes mentioned, the floods often continue for two or three days at a time, and at such times the water rises to within a few inches of the surface of the marsh on

Estate ;* but if the river be straightened, as proposed, through Farm, and the weirs removed, this flooding, at least at , could not take place, and in the plan I have adopted for the outfall of the drainage water from Estate, the flood in the river could in no way affect the drains in the marsh. From the facilities offered for discharging the water by the improved river, if a flood should take place it would only be of very short duration, and incapable of doing any mischief.

At present we have no means of counteracting the evil complained of, but give the drainage a better outfall, as proposed, and the marsh would be rendered as dry, as valuable, and as suitable for building on as any other portion of Estate. In looking, therefore, at the cost of the purchase of the property now offered, it seems but fair to consider what additional value would be given to Estate This we may approximately arrive at. The marsh in question contains 3 acres 1 rood, which in its present condition I value at 20*l.* per acre, giving 65*l.*; when drained, as we at present propose, it would be worth for gardens and such buildings as could be erected on it,

* In times of flood, from the position of our only outfall at present available, the water would fill the drains, and, until the flood retired, the drainage water would not be able to get away. Obedient to the natural law, fluids will find their level, and, although sometimes even when under water drains may be seen to discharge, this is only an hydrostatic paradox, due to imperfect capillary attraction, for the drains would take in as much water from the brook as they would discharge under such circumstances, therefore the actual condition of things would be the same, or even worse. It is well known to engineers that currents running in opposite directions and at different velocities (depending on pressure, and in a confined channel like that of a drain) will not easily mix. It is but reasonable to suppose that some of the water from the brook would thus find its way into the soil of the marsh and into the foundations of buildings, if any were erected on it, and would not be returned to the river until the stream assumed its ordinary dimensions so as to allow the drains free action.

85*l.* per acre, giving 276*l.* 5s.; but if rendered fit for the erection of shops, it might be divided into thirty-two 30-feet allotments, each of which would be worth 40*l.*, or 1280*l.* altogether. The difference, therefore, between 1280*l.* and 276*l.* may fairly be subtracted from the sum given for Mr. 's property, reducing it from 3150*l.* to 2146*l.*, and this without taking into consideration the value of the improvements which the purchase would enable the company to carry out on Estate.

After removing the weirs, it is proposed to straighten the river through Farm by the new cut marked G H on the plan; this would greatly assist the water in getting away, would improve the appearance of the property, and lay it perfectly dry, preventing floods, or at least their continuance for any length of time, to prove injurious. In forming this new cut, I would lower the bed or level of the river as much as possible to the road bridge marked F, and, instead of adopting the present outfall for the marsh drainage of Estate at A, I would carry the drainage through Mr. property to the point F, as marked by the red line A F on the plan. By this means I should be enabled to give at least 4 feet additional depth to the drains in the marsh, and by disconnecting the drainage from the river at the point A, should prevent the water in time of flood from getting to the marsh at all.

I would not further attempt to improve the present condition of the river between the points A and F than by removing the weir C, for it would be both very expensive and difficult, without any purpose valuable to the company, to interfere with the existing skewback arches* under the railway culvert A and the bridge F;

* I wish to be understood that I have sufficient practical knowledge of such matters not to fear undertaking them and carrying them pro-

in fact, it would only be going to a great expense to improve property not belonging or ever likely to belong to the company, such as that of Mr. 's, and part of town.

All I would ask, therefore, of the railway company would be to allow a small tunnel to be made under the bank, for the purpose of putting in that portion of the outfall drain A F by which it is intersected; this would be a trifling matter, and, if carefully done (as I would see that it was), would involve no danger of sinking to the railway embankment, which more extensive operations (and particularly such as pulling up old foundations, and working in water) would be very liable to create. I may mention the fact that the culvert in question, when first built, fell in, and had to be reconstructed.

I have now given my reasons for recommending the careful consideration of the offer which has been made to the company, and suggestions to render the purchase, if made, as efficient and useful as possible. I have not had time to make out so good a report as I could have wished, or to mention many matters I should like to have done; what I have said I hope I have rendered intelligible.

I have the honour to be, sir,
Your most obedient servant,

,
Surveyor.

, Esq.

perly out, but the expense of deepening the skewback, and putting in fresh foundations to the walls, working all the time in water, would be greater than the company ought to undertake; and in works of this kind there are always continual and unavoidable delays and extra costs.

II.— *'s House,*

Gentlemen,

In order to put the house in thorough substantial repair, and in a condition to let to advantage, I think that we should consider it as consisting of a cottage and shop, as likely to produce the best rental.

The present condition of the building is very bad, and looking at the expense of putting in thorough repair, I recommended on my first visit to it that it should be converted into three cottages, and three comfortable cottages might have been made of it if desirable.

On my last visit I looked at the roof, and I find several slates off at the south-eastern corner, as well as round the chimney. Neither cement fillet nor lead flashing appear to have been put round the chimney.

The guttering is too narrow, and instead of being laid with an inclination from each end to the middle, the fall ought to have been from front to back, and ought now to be made so, the present conductors removed, and the cementing outside made good.

The guttering should be carefully examined, the zinc stripped off, and lead 5 lbs. to the foot substituted, well turned up and secured by holdfasts to the wall of the blocking course at least 6 inches, and turned up under slates at least 8 inches; the gutters should have a proper drip or inclination to the east end of the building, where conductors with large cistern heads (one to each gutter) should be fixed, either to conduct the water into a tank, or to carry it into the sewer.

The present drain from the house (in the footpath) appears to be in a bad condition; it should be taken up and relaid, and continued by additional pipes to the

bottom of the conductors just alluded to; to the overflow pipe of the tank, if one should be constructed.

The present lean-to should, I think, be pulled down, and the materials used in constructing two water-closets and dust-bins according to the sketches herewith.

The water-closets should be connected with a properly trapped cesspool, the overflow going into the drain.

The water-closets should, I think, be erected at a short distance from the buildings, in the garden, comprising a closet and dust-bin for each house.

All the outside doors should be looked to, the fasteners, hinges, and locks put in order, the lines, fastenings, and shutters to the windows should be also attended to.

The outside cement work should be repaired where necessary, and colour washed at the completion of the works. The coping and inside of the blocking course, and much of the coping of the front and back gables, should be stripped and re-cemented.

A slate or stone step should be put to cottage door on footpath.

BASEMENT.*

It is proposed to give the whole of the basement story to the shop, consisting of shop, kitchen, and store-room. The places should be thoroughly cleaned out, and the walls white lime washed twice. The well in the corner should be domed over in brickwork $4\frac{1}{2}$ inches, with a hole in one side for suction pipe. (This well is 20 feet deep, fed by a good spring.) If the well be found sufficient to supply the cottage as well as the shop, a suction pipe should be laid from the well to the end of the

* The basement story is only 6 feet 1 inch in height in the clear between floor level and bottom of joists.

house, where a pump should be fixed, with proper trough and drip stone connected with drain by a small gully covered with iron grate. The present conductor pipe leading into it to be cut away, and holes and damage caused thereby to be made good up to eaves.

A galvanised iron set-pot to be placed in the kitchen close to the bake oven, and all repairs to the fireplaces to be made where required. If there be not a door at present between the store-room and scullery, one must be provided, a $\frac{3}{4}$-inch batten door, with hinges and fasteners complete, hung to strong 3×3 fir frame.

Provide in shop a chimney opening at a higher level than the present one, cutting out proper jambs, and putting over trimmer arch on chimney bar, turned, and corked at ends; the level must accord with the level of the floor when raised. Provide a proper York stone hearth and back hearths, the hearth stone to be supported on fender wall to be built up for purpose.

The shop floor to be raised 12 inches above the present level, and the dwarf walls for supporting the same to be carried up so as to underpin the wall plates, and fix them at the levels required. It is not intended to pull the floor to pieces to raise it, but if the joists are fixed in the walls they must be cut off at the walls, and a $4\frac{1}{2}$ wall, with plate 4×3 on the top, must be erected for carrying the ends of the joists.* The floor may be raised by block tackle and lever in one piece, by having a sufficient strong beam fixed across the floor above, make good the floor, and fix up the chimney-piece at present in the shop. Make good all damage to the floor,

* Instead of cutting the joists off the floor intended to be raised, channels (afterwards bricked up) are cut in the walls over each of the joists, high enough for the floor to be raised, but I do not recommend that plan in this case.—J. B.

replace boards taken up for getting at the joists to build dwarf walls, and make the same good and perfect, skirting round the walls with skirting moulded at top and 9 inches high.

Remove the present shop window and door, both side and front, taking care to put all requisite props and supports to brickwork over same.

Build up piers in Portland cement and hard brickwork when shown on the drawings, placing on the top of same, bedded in cement, York stone caps, flush all round for supporting breastsummers. Brick up for the whole space thereof the large opening next the footpath, and leave a window.

Provide summer beam 9×12 to rest upon the piers in front for carrying shop facia and wall above, make good and build up wall above summer beam to meet the work above, taking care to keep all solid and secure.

Render float and set the walls of the shop, and lath, plaster, float, set and whiten the ceiling.*

Put up two story posts 9×3 to act as frame to doors, additional supports to the breastsummer, and sides to windows, mortised into summer beam at top, and at bottom securely stubbed into stone supported on brickwork. Put an oak sill under each window, framed into story posts at one end, and secured in the brick piers at the other, rebated to receive the bottom of the shutters.

The shop door to be formed in two halves, $1\frac{3}{4}$ stuff moulded panels at bottom, and glazed panels at top, hung to story posts with three strong 4-inch iron butt hinges to each half door, fitted with a 9-inch iron-cased lock with brass furniture, and two strong iron barrel

* No inside plastering has yet been done to shop, either walls or ceiling.—J. B.

bolts. Put up shutters to glass panels to fasten inside, with wrought-iron pins and sockets at top, and strong thumb screws and sockets at bottom, the soffit between the story post at top of door to be panelled. The window frames to be formed of $1\frac{3}{4}$ stuff, according to the drawings, glazed with the best strong sheet glass.

Form the pilasters, facia, and mouldings to shop front according to the drawings.

Fit up shop front with shutters rebated, beaded at edges to fit, panelled, bead and butt, and 1 inch thick, properly shod at bottom corners with iron shoes, and each window secured with proper wrought-iron bar fasteners and bolts complete.

Form landing at present level of shop floor with two wooden steps down from the level of floor when raised with balusters (turned) and handrail, as the means of gaining the level of the kitchen through the existing door of communication between shop and kitchen, as in sketch.

A, level of kitchen and door at present existing one step down from present level, C, of shop floor. B, altered level of shop floor. E and D, steps down to original level or landing, C.

F and G, turned balusters for supporting plain deal handrail from F to G and G to H.

K, existing window from shop into kitchen not altered.

Remove the pump in the corner of the kitchen, and make good the floor after the same.

Glaze the window, and provide sash for same to open in two parts, French fashion, with proper fasteners and hinges, the window frame looking from kitchen into lean-to; the size within the present frame is 2′ 11″ × 2′ 5″.

Remove the existing staircase, rising from the shop in the top floor with the enclosures to the landing-places, and make good the well hole in the floor with joists and boards to match floor size seven space 3′ 6″ × 4″.

The top bedroom in front over shop may be converted into two rooms, according to sketch, the doors and partitions placed in the position shown in the drawing. The partition to be framed with quarters, heads and sills, and strutts; quarters $2 \times 2\frac{1}{2}$, heads and sills $3 \times 2\frac{1}{2}$, strutts $2 \times 2\frac{1}{2}$. Provide a door of $1\frac{1}{2}$-inch stuff, four-panelled square framed, and hung to single rebated and beaded linings ($1\frac{1}{2} \times 3\frac{1}{4}$), and hung with two butt hinges, and with iron-rimmed lock for fastener, with catch and brass furniture.

The present low floor in shop, with well hole in centre, to be removed altogether.

In order to gain the first floor from the basement, a staircase to be constructed from the store-room as shown on the sketch, and to give headway portions of the cupboards* under the existing stairs from the ground level to be removed. The staircase to be formed with inch round-nosed treads and $\frac{3}{4}$ risers, framed into $1\frac{3}{4}$ square-cut skirtings, properly blocked and glued with newel deal handrail and square balusters.

For entering the bedroom, break open the present bricked-up opening, and insert deal rebated frame $1\frac{1}{2}'' \times 3''$, and provide a four-panel square-framed $1\frac{1}{2}$-inch door, hung with two 3-inch iron butt hinges, and fastened with spring lock with brass furniture.

The present partition to be repaired.

The cornice to top front bedroom to be stripped down (as much of it has fallen); make proper fireplace in this

* These cupboards are perfectly useless, and most inconvenient.

room, with hearthstone, back hearths, &c., complete, fix up stone chimney-piece about 10s. cost, and register grate value of 34s. Repair the walls where requisite, and clean and twice whiten the ceiling.

In the adjoining bedroom, the cistern to removed, and the damage caused thereby to be made good, such as the repairing of the floor, the replastering of the walls, &c.; remove the conductor and waste pipe, and make good holes and damage caused thereby, as under present proposed arrangements the conductors will be placed at the end, and not in the centre of the building.

The above includes all the substantial repairs and alterations at present proposed. The house will require repapering as well as the cottage, but that can be done after the rest of the work is perfectly dry and completed.

All broken panes to windows to be made good, and the wood trap from footpath to coal-cellar to be repaired. The drain also from this point to be opened and relaid as far as necessary.

A York stone step 3 inches in thickness to be provided for shop door, into which the story posts will be fixed by removal of present projecting windows; a piece of additional York paving in front will be required $18' 6'' \times 3'$.

The old materials, which are by this specification directed to be removed, must be valued by the contractor, and the price allowed for the same must be stated in his tender, which will be deducted from the amount of his contract.

The lean-to to be pulled down only to the level of the ground, and the walls coped round with brick on edge set in Portland cement. The present approach steps to be left and put in proper repair.

Estimated cost of works recommended to be done . .	£150	7	6
Value of old materials to be taken by contractor . .	20	10	0
	129	17	6

Surveyor.

March 14, 1864.

Note.—In the above estimate, I have put down the fair full price to be allowed for old materials, and I have given the fair current value for work to be performed in a lasting, substantial, and businesslike manner. I have estimated each item separately and carefully, and have endeavoured, as far as practicable, to keep down the cost. I should suppose the shop and cottage when completed, including the workshop in the garden in the neighbourhood of , would let for 40*l.* per annum together, being equal to about an outlay of 600*l.* at 7 per cent.—J. B.

P.S. If converted into three cottages at 13*l.* per annum each, the rent would have been 39*l.* The front cottage, as a small shop, might perhaps have been let at 16*l.* per annum.

III.—*Report referring to the sinking of an Artesian Well near London.*

December 9, 1854.

Dear Sir,

In obedience to instructions of the of last, that I should take steps to obtain information respecting Artesian wells, and report on the general subject, with the view of elucidating the course proper to be pursued in the event of its being determined to sink such a well upon the of , I beg to say that I have been enabled to accumulate a considerable amount of practical data bearing directly upon well-sinking, both common and Artesian—more indeed than could be conveniently, or perhaps need be, embodied in my report.

The subject of Artesian well-sinking involves considerations which perhaps should properly be taken up

under several distinct heads, such as the geological, structural, and economical. To this method I have not strictly adhered, but the subject being one which cannot be said to be familiarly and generally known in its details, it appeared to me that I could not usefully report upon it without touching upon the principles as well as the practice. In doing so, I have no doubt introduced some matters which are well known, but their presence I hope will be excused, on the ground that they could not well be passed over unnoticed. It will be found that in treating of common and Artesian wells they could hardly be separated, inasmuch as, although distinct, they are usually united when the latter is adopted.

Artesian wells, as commonly understood, are such as are formed by boring through strata devoid of water into strata which contain that element, and they derive their name from this ancient mode of obtaining water having been revived in France, in the county of Artois, the ancient Artesium. As regards the name, however, Dr. Buckland, in a lecture delivered November 19, 1849, said he would venture to affirm that, although there were from two hundred and fifty to three hundred so-called Artesian wells in the metropolis,* there was not one in reality within three miles of St. Paul's. Twenty or thirty years ago, he said there were many Artesian wells in the neighbourhood of the metropolis—namely, in the gardens of the Horticultural Society at Chiswick, in that of the Bishop of London at Fulham, and in Brentford and its vicinity; but the wells now made by boring through the London clay were merely common wells. An Artesian well, according to Dr. Buckland, is one which continually and spontaneously overflows, and if it ceases to do this it is Artesian no longer; but I find

* Five hundred would be a nearer estimate.—J. B.

the name is applied to bored wells, whether those from which the water ascends above or overflows the surface of the ground, or those in which it rises to various levels considerably above the surface.

In order to apprehend readily the various circumstances that may present themselves in preliminary considerations, and in positive operations connected with the sinking of a well of this important kind in the neighbourhood of the metropolis, it is necessary to have a tolerably familiar idea of the geological structure on which London immediately stands.

What is termed the London Basin presents the components and stratification here following—namely:

London or blue clay
Plastic clay and sand
Upper chalk
Lower chalk
Chalk marl and firestone
Blue marl
Iron sand.

This series of strata has a concave form in relation to the horizon, and the individual members of it successively crop out beyond each other at a greater or less distance from the metropolis, the breadth of the outcrop of each being proportionate to its thickness underneath. It is very obvious that in the case of those strata that are of an impermeable structure, the rain falling upon them will pass by the readiest channels to the rivers, and thence to the sea; while in the case of the permeable, the rain being absorbed, will settle towards and accumulate in their lower portions. It is by the alternation of the permeable and impermeable strata that the water in the former is so upheld as to be available by means of wells.

The London clay and plastic clay are both impermeable to water, but the sand which is intermixed with the latter is recipient where it crops out. The upper chalk, though compact, is somewhat pervious, and it is intersected with lines of flints, around which a greater permeability exists, also with fissures, which are recipient of water, and generally full of it. The lower chalk also is pervious and saturated, so far as its own extreme density and the defective impermeability of the strata beneath it permit. The marls and other strata underlying the chalks are comparatively impermeable, and they therefore serve to uphold the water contained in the latter.

The chalk beds of London are considered to be an unfailing source of pure soft water. Messrs. Conybeare and Phillips say that the lower beds, and every fissure in them, are with very few exceptions completely filled with water. Near the valley of the Thames, the water in Artesian wells rises very near to the surface, but in the higher districts of the basin the common well has generally, to more or less extent, to take the place of the Artesian: there are, nevertheless, in the basin many overflows.

In regarding the extensive outcrop of the chalk around that of the London clay, the recipient character of its structure, and its consequent saturated condition, we are apt to forget the tenacity with which, beyond an evaporable depth, it keeps its hold of the water it contains. Its capillary attraction is such that, when taken from the earth, it can hardly be made to imbibe an appreciable additional quantity of water, and this property and that of retentiveness may be regarded as identical; this solid chalk itself, holding the water in suspension, will not part with any quantity to speak of, and for the supply of wells, we must depend solely on the fissures

and flint beds that intersect it. The formation is of a very remarkable character, the flint beds varying from, say an inch to a foot thick, when viewed sectionally, as they may lie in the deep cuttings of the Dover and other railways, are at regular intervals of 3 or 4 feet apart, and when exposed and individually on their upper face, must present the appearance of a compact though somewhat rough pavement.

The well-digger and borer, I should think, may calculate the number of them he will have to cut through in a given depth. In the interstices of these flint beds the water is found in a free state, but mainly at a considerable depth. On the at , a well is now being sunk. When I last had particulars, a depth of about 100 feet had been attained, the whole, excepting about 30 inches of vegetable mould and other top strata, being in the chalk, including the usual flint beds, but these to the depths named were quite devoid of water, which is expected at about 20 feet lower down. The absence of water in so many of these flint beds is no doubt owing to their ranging parallel with the horizon, instead of making an angle therewith, and cropping out, so as to present their interstices to the atmosphere.

We are accustomed to hear respecting wells which are sunk adjacent to each other, that the deeper has drained the shallower; indeed, where the extra depth in the one exceeds the depth of water which stood in the other, that the latter has been drained dry. This is a phenomenon which takes place largely between wells and cesspools; the well being deep if near, drains the water from the cesspool which is shallow.

The owner of a cottage and small garden wishes to render his domain as independent and complete in itself as possible. The subsoil proving favourable for water-finding, he sinks a dry-built well to obtain fresh water;

it being also favourable for drainage, he sinks a dry-built cesspool to get rid of waste water, and he is afterwards disappointed to find that the two receptacles are connected through the medium of those strata, on the valuable and available properties of which he had congratulated himself. I think it is at the breweries of Messrs. Calvert on the City side, and Barclay on the Borough side of the river Thames, that it is known when each other's pumps are at work, the wells of both having their supply from the same water beds, and the pumping from the one lowering the water in the other. This, however, is applicable only to the ordinary wells which are sunk above the London clay, and are fed by land springs; the adjacency of Artesian wells of unequal depth cannot affect the hydrostatic balance which prevails in the vast basin underlying the London clay, beyond the temporary measure which may result from the withdrawing power of the engine exceeding the pace at which the supply streams in through its tortuous channels.

Land springs, or those found near the surface of the ground, are supplied by rain, and in dry weather often cease to flow. Well springs, or those found at considerable depths, are subject to the same laws; they consist of or exist in porous matter, interposed between impermeable strata, with somewhere a surface exposure. These strata, where exposed, receive water elsewhere at lower levels; they leak or overflow, forming rivulets, which are seen to be influenced in their height by the seasons, their natural volume being at one time augmented by rains, and at another diminished, through the reduced hydrostatic pressure at their source, consequent on the reduced supply at the outcrops of the strata.

Where success in boring for water is to be expected,

is where permeable strata lie underneath such as are impermeable, and have a basin-like form, permitting the former in parts to crop out, the permeable outcropping strata receive water at the surface, which collects beneath, and the height to which the water will rise in a perforation made through the impermeable strata, will correspond to the hydrostatic pressure in those underlying them containing water.

When it is intended to sink an Artesian well, a thing of primary importance to be known is the water level of the district; that is, the surface level of the water in the subterranean basin, whose contents are excluded or suppressed by the overlying impermeable strata. Should the situation of the intended well be in a valley in those strata, it may be that these have only to be penetrated through to set free a jet which will rise high above the surface; in such case the Artesian bore commences immediately at the surface. Should the situation, on the other hand, be on a hill, in those strata the water level will probably be considerably below the surface, and in such case a common well has to be sunk down to a point somewhat below the water level to form a receptacle for the water from the bore, which commences at the bottom of it, and from this common well or receptacle, the water has to be lifted by means of pumps worked by adequate power. To extend the common well to a depth short of the water level, and, after boring and obtaining water, having to continue it, must obviously be attended with inconveniences; hence the desirableness of having as approximate a knowledge of the water level as possible to begin with. In the case of Messrs. Verey's brewery well at Kilburn, the shaft is 250 feet deep, and the bore (8-inch) is 30 feet more into a sand spring, making 280; the water rises about 150 or to 130 from the surface. The water level of the district being well known, it was

at first intended to sink the shaft only 200 feet, and then have bored, but fears arose that the depth of water which in that case would have risen into the well, being only the upper head of the spring, would not afford a sufficient supply, seeing that if pumps be fixed at too high a level above a spring, the hydrostatic pressure may not be sufficient to cause the supply to keep pace with their withdrawing power; the additional 50 feet, therefore, was given to the shaft, and an experiment made after the water rose justified the considerations which had been acted on. A temporary pump, with a 6-inch pipe and 9-inch stroke, worked by eight men, and throwing out 24 gallons per minute, lowered the water about 33 feet beyond that depth; they could not affect its level; the true strength of the spring was thus ascertained. Another duty which this upper structure performs, supposing it to be, as it usually is, a built well, and which equally applies to the tubing in an Artesian bore, is the shutting out of the land springs, the water of which, being usually of an inferior quality from the distance of its infiltration being insufficient to divest it of vegetable and other impurities, it would not be desirable to admit into combination with the water obtained from the pure fountain beneath.

When a common well is sunk in firm rock, even in chalk, probably not more than a short way down from the surface is necessary to be lined with masonry, to support the vegetable mould and other superficial strata, and exclude surface water and land springs; but when it is sunk through gravel, sand, clay, and other similar beds of a loose and friable nature, it has of course to be lined, so as to secure their perfect exclusion. This may be done with stone where that is plentiful, but as shaped materials are necessary to ensure stability, brick offers peculiar advantages, only being in such a situation kept

continually damp, it is important those used should be of the soundest quality, vitrified if possible. As regards the form of the well in its horizontal section, it is obvious that the circular is, without any conceivable exception, the best, affording as it does the greatest and most equable resistance to the pressure of the soil, and the greatest capacity in return for a given expenditure.

In the Oases of Thebes were discovered many Artesian wells, the shafts of which, measuring from 6 to 10 feet wide, were square, and lined with wood; this extended to as much as 80 feet deep, where the bore commenced.

There are two modes of construction in use, adapted to dry or firm, and wet or loose ground respectively. Where the ground is of the former character, the excavation is carried down to a safe depth, and made level around at bottom. Upon this is laid a curb or ring of timber, formed in two or more thicknesses, and lap-jointed to equalise its strength, cut circular on the inside, but not on the out, of a breadth sufficient to receive the brick lining of the well, and not less than 3 inches thick. On this, truly concentric with a central plumb-line, the brick lining is built up to the surface, the earth, or a puddling of clay, being punned hard in around the outside as the work rises. The excavation is now resumed in the centre, leaving enough earth undisturbed under the curb to support the work done. When a safe depth is again attained, the earth under the curb also is removed in four equidistant places, the duty of support devolving on the intermediate portions left as piers, and from a broad central footing of timber four raking strutts are set up, and firmly fixed to support the curb in the points from under which the earth was taken. This being done, the piers of earth are dug away, and the bottom, as before, made level around, as a bed for a

second curb; and thus the work proceeds in stages downward to the required depth, the projecting angles of the curbs outside, by their penetrating the soil, contributing to the support of the brickwork in its progressive extension downward. When the ground is known to be of the wet or loose description, the old method is to render the surface of the ground in the site of the well perfectly level, and to lay thereon a curb composed of ribs, clad outside with boarding, and forming a cylinder, say 6 feet long, with a smooth exterior, and sharp lower edge; so that when the ground underneath and within it is excavated in a regular manner, and brickwork is built upon it to form the lining of the well, it sinks by its own gravity, the sinking below and the addition above keeping pace with each other; and the bricklayer continuing outside at the surface while the digger inside descends, the soil being hoisted out as fast as the latter excavates it, and the process continuing until the desired depth is attained.

From the swelling of the ground, it by and by becomes bound, and then the process has to be recommenced to a smaller diameter.

It frequently happens that provision for the exclusion of land springs and sand springs, more important than mere mortar-built or cement-built brickwork, is necessary. Iron cylinders, either cast or formed of boiler plates riveted together, flush outside, are much employed. In the case of the well at Camden station, the entire depth of which is 400 feet, the shaft is 180 (36 beyond the level to which the water rises), $9\frac{1}{2}$ feet diameter in the clear, and built with cement all the way down, but for the first 28 feet, there is first an inner steyning of half brickwork in cement; next, segmental iron cylinders, then 9 inches of concrete; and lastly, an outer steyning of 9-inch brickwork, in all full 2 feet

thick. Below the 28 feet the steyning is in 14-inch work, with the occasional bonding curbs of iron. In the case of the well at the Hanwell Lunatic Asylum, after sinking a shaft 10 feet in diameter to the depth of 30 feet, and thence a shaft 6 feet in diameter down to the mottled clay, in a part of which iron cylinders lined with brick steyning were employed, the water from a bed of flints at 290 feet deep rose with such force and volume as to overflow, at 26 feet above the surface, at 23 gallons per minute, the shaft proving unnecessary, the large diameter being capped over, and a rising main fitted to it. The district in which the asylum is situated is adapted for purely Artesian wells. The building the brickwork dry, or in mortar, or in cement, or dry, with occasional rings in cement, must be regulated by the nature of the soil and its variations. In the Hampstead Heath well the brickwork is 9 inches thick, laid dry between rings set in cement, but it is in two half-brick steynings, and the cemented rings in the one are midway between those in the other. The lower part of the steyning is bound to the work above it by four tie rods, bolted to a cast-iron curb some distance up the shaft; by such means the lower part of the steyning of a well may be secured against derangement through the soapy, slippy nature which the mottled clay acquires when exposed to the air. Sometimes the rush of water from the water-bearing sand strata is so great that it is found expedient to relinquish the pumping of it out, and bore through it; indeed, that may become the only course left to pursue. With the water much sand is often brought up, which enters the shaft at its lower edge from behind the brickwork, leaving cavities that sometimes cause considerable depression in the surface of the ground, and threaten destruction of buildings. In such cases, it seems the best plan to sink a tube formed of boiler plates of a diameter

that will just pass down through the portion of shaft already executed, and of considerable length—say as much as 50 feet—as was done in the Hampstead road, the force employed being hand screws applied on the top edge. By such means a very difficult part may be passed, and should others succeed it, other similar tubes of a less diameter may be passed down in order to cope with them.

The methods of operation pursued, as regards the Artesian bore, are very various, being regulated by the general character of the case, and the particular circumstances that present themselves during progress. If solid, dry strata only had to be penetrated through, probably a bore of a uniform diameter of 3 or 4 inches, and without any tubing, would suffice; but even supposing that no wet strata in the early part of the bore should render it necessary that tubing be inserted, water or sand, or both, may present themselves at some considerable depth, and render such lining imperative. Should strata, then, of a mixed and moist description succeed each other, it may be necessary to continue that tubing uninterruptedly, and it will come to be considered whether the same diameter should be continued throughout the depth, or a telescopic diminution will be sufficient, or will better answer the purpose. On the other hand, should a great depth of hard, dry strata succeed the part where the water-bearing strata or sand have been shut out, it may not be considered expedient to go to the expense of lining it; and should wet strata again be encountered, it may suffice to sink smaller tubing down through the first for the lining of that deep wet portion of the bore only. The whole bore may be without lining, or it may have to be wholly or partially lined, and the lining may be uniform, or it may be telescopic, according to circumstances. When the strata are al-

together of a kind disposed to run into the bore, the tubing of a uniform diameter offers the advantage that the lengths may be screwed together continuously, and thus present no inlet, such as must unavoidably occur in some measure at the joints of telescopic tubes, but then the tubes are liable to become bound in the driving, and there is then nothing for it but passing down others of smaller diameter in their interior. If such should happen when the first tubes are very small, they may have to be withdrawn, and the entire bore enlarged for the reception of tubes of a diameter that will admit of others being passed down through them, should the necessity present itself. A knowledge of local precedents, if there are any, has to be brought to bear on the matter in the outset, and the error should rather be in the direction of over large dimensions than over small ones, to obviate the chance of having to do work twice.

The records which are published of the difficulties encountered, expedients originated, tools contrived, materials changed in the construction of many noted wells, are full of the most instructive precedents, and must go far to clear the way for future operations of a similar description, and, as regards practicability and the *modus operandi*, make the mind easy in any case.

The tools employed are boring rods, screwed together in lengths, and usually numbered for the purpose of ascertaining at any time the depth of the bore, and, by the materials brought up, the depths of the various strata bored through. Rods all 10 feet long would be most convenient as concerns measurement, but they are occasionally giving way at the joints, and in the repair the regularity in length is not attended to. I have heard of deception being practised as to the depths by parties who seemed to regard confusion as advantageous. I am of opinion that time may be much economised, and the

interests of geological science advanced, by attention to this point.

At the lower end of the rods is the cutting chisel, or augur, or bucket tool for boring, or for lifting out. The tool is usually of considerably more diameter than the rods, and so also are the screwed ends of the latter. When lining tubes are inserted, these follow on the rods, and the tool makes the bore of a size adapted to receive them; but in the case of the well at Mortlake, the first augur used was 7-inch, while the tubes that were driven down the bore measured 8 inches outside; down through this a second augur, 4-inch, was introduced, and a second tube, $4\frac{1}{2}$-inch, driven in, and through the latter an augur, $3\frac{1}{2}$ inches, was worked.

At the brine well at Kissengen, in order to draw up the salt, there was, first, a 5-inch tube driven to the depth of 330 feet to exclude the land springs; secondly, within that a 3-inch, 1740 feet, its lower end immersed in slightly salt water; and thirdly, and innermost, a 2-inch, 1940 feet, into the rock salt. By this arrangement the slightly salt water is forced up between the outer and middle tubes, then down between the middle and inner to the rock salt, whence after saturation it is forced up inside the inner tube, the propelling power being a subterranean atmosphere of carbonic acid gas, acting with a force of sixty atmospheres, the column of water started up to a height of 48 feet above the surface; a tower is erected, from which spectators view the *jet d'eau*.

In the Camden station well the bore is 220 feet deep, and the pipes therein stand 60 feet up the shaft; steadied up stays secured to the brickwork, with a sluice for admitting the water into the shaft about 4 feet from the bottom of it, worked by a handle placed above the water level.

In the well of the Abbatoir, at Grenelle, Paris, as the boring progressed, tubes of rolled iron, and subsequently of copper, were inserted; the first were $12\frac{1}{4}$ inches diameter, and the last $6\frac{1}{2}$ inches, reaching to a depth of $1794\frac{1}{2}$ feet. During the progress of sinking and withdrawing them contortions took place. Amongst the theoretical reasons given for this phenomenon, was that of violent pulsations in the flowing water acting upon them and beating them inwards, but this idea was rejected as not being in accordance with the laws of hydrostatic pressure, and the contortion was attributed to the force used in forcing the tubes down, and the still greater violence necessary to be exercised in drawing them up.

In sinking the well at Charleston, in America, much difficulty was encountered; rocks almost innumerable alternated with beds of loose sand, and in the former occasional nodules of adamantine hardness, which successively turned the chisel and tubes aside, and for a while resisted all efforts at their reduction. The first 80 feet was lined with cast-iron tubes of 6 feet internal diameter. The bore through the rocks was at first made $3\frac{1}{2}$ inches diameter, without lining, and in each sand bed a chamber was caused by the flowing in of the sand; in the morning the well was generally less deep by 50 or 100 feet than in the previous evening, and at 700 feet the sands ran in so fast, and in such quantities, that no progress could be made. It was now determined to shut out the sands by a system of tubing, and the whole orifice had to be increased to full 5 inches; the first tubing, several hundred feet long, proving too light, and becoming unmanageable, had to be withdrawn, and other substituted. These measured 4 inches inside and $4\frac{7}{8}$ inches out, screwed together so as to form one continuous tube from the bottom, 1102 feet deep, up to the

surface; 24 feet of the thin tubing refused to be withdrawn, and was partly thrust aside and partly cut through.

In sinking the tubes, they were made to follow a few feet behind the chisel, and when a rock was encountered, they were, if possible, arrested about 18 inches above it, and a tool sent down which could be opened below the tube and cut a hole 5 inches in diameter, then be closed and withdrawn; but in some cases the tubes were caught close to the rock, and then, as the tool just mentioned required 18 inches clear length below the tube to open it, a different tool had to be sent down, which drilled a hole of $3\frac{1}{2}$ inches diameter entirely through the rock, and could then be opened to 5 inches and worked upward to the mouth of the tube, when it could be closed and withdrawn; these operations were performed with tools whose handles were upwards of 1000 feet long. The sand still continuing to give annoyance, rushing in along with the water when the rods were withdrawn, and filling the well sometimes to the depth of 60 feet instantaneously, a remedy was resorted to, which consisted in building a reservoir to contain water, and, as the rods were withdrawn, letting the water into the well to produce a downward current, and which was used at times to loosen the sands which got packed about the mouth of the tube, and thus enable them to proceed. In the latest accounts which I find, the lateral pressure on the tubes had increased so as to require very powerful leverage and heavy blows to force them down, so that the joints showed signs of giving way, and it was therefore not considered that the system of tubes could be sunk much lower, but other tubing of a size small enough to be let down inside it would presently be adopted.

The lining the bore with pipes is so efficient in ex-

cluding from it laterally not merely solid materials, but water itself, that in the well at the Royal Hospital, Haslar, Gosport—where the water rises through 125 feet of shingle and running sand, full of salt water, and acted on by the tides—the stopping out of the salt water was completely effected, the water from the bore being of the purest and softest quality.

Boring, as compared with common well-sinking, is economical; by adopting it, the expenditure of tens of pounds may save hundreds. It is also available where the other is not, and is equally applicable on dry land and under water, and may be executed in a vertical, a horizontal, or an inclined position. At Trafalgar-square there are two wells, with a horizontal tunnel or driftway 6 feet in diameter connecting them at 5 feet from the bottom of the shafts, a point lower than the level to which the water rises. This tunnel acts as a reservoir or store for the water when the engine is not working, and ensures a sufficient supply to the pumps even supposing they drain the wells at a rate faster than that at which the springs supply them.

The property which water, in common with other liquids, has of preserving uniform level in different receptacles communicating with each other, is usually brought into operation in schemes of water supply. The water has to be accumulated in a great basin, or reservoir; from this pipes ramify to the various quarters where the supply is to take place, and, supposing these pipes, in their course, to be carried under ground, and at a lower level than that of the water in the reservoir, and then made to ascend in various buildings, the level to which the water will rise in them will correspond to, and not exceed, that of the water in the reservoir. In order, therefore, that, if possible, the highest stories of the highest houses in the highest streets shall be supplied by virtue of one concentrated force, it becomes a

desideratum to place the reservoir at an adequate altitude. The New River gravitates to what is called New River Head, at Pentonville; but more than half the water supplied to the metropolis is derived from the Thames, from which it has to be delivered at heights much above the level of that river, and, consequently, has to be raised into the reservoirs by artificial pressure, as has the water of the New River itself from its head to the reservoir on Pentonville-hill. In case they may be at all suggestive, I subjoin levels of some of the London reservoirs and canals in relation to Trinity datum, otherwise high-water mark of the River Thames:

	Feet.
New River reservoir, Pentonville-hill (above datum) .	118
Reservoir, Regent's Park . . do. .	113
Grand Junction Water-works, Paddington do. .	$86\frac{1}{2}$
Lake, surface, Regent's Park . . do. .	$84\frac{3}{4}$
New River, at City-road . . do. .	$81\frac{1}{2}$
Reservoir, Kensington Gardens . do. .	$70\frac{1}{6}$
Regent's Canal, City basin . . do. .	$51\frac{1}{12}$
Reservoir, rim, Regent's Park . do. .	$43\frac{1}{3}$
Serpentine, surface . . . do. .	$37\frac{3}{4}$
Surrey Canal, surface . . . (below datum) .	$3\frac{2}{3}$
Lake, surface, St. James's Park . do. .	$5\frac{1}{12}$

Respecting the site for the proposed well at New Barnet, I would recommend that it should be sunk on the highest part of the estate; that, I think, will be found to be the hill nearest to Chipping Barnet. In such situation I fully expect that the depth will have to be just so much greater than it would be if the well were sunk in some lower part of the land, but the cost of this extra depth will, I think, be more than compensated by the reduced first cost and subsequent wear and tear of machinery. I assume that, under any circumstances, a high-level reservoir would be placed upon that hill, or some similar eminence, in order that all parts of the estate should be supplied with water by gravitation; supposing such to be the case, the pumping engine, if the well were situated in the lower land,

instead of having simply to perform a direct up lift from below itself, would have to force the water in some oblique direction, to a situation say a quarter of a mile or more distant, and to a level probably nigh 100 feet above its own, having to contend with a much increased amount of friction and other resistance, which would have to be provided for by an increased power in the engine and increased strength as well as quantity in pipes.

I find, by reference to the Great Northern Railway Company's sections, that our datum level on the west side of the railway is, above Trinity datum . . . . . 162.50 feet.

Add to outfall of our drainage at the railway culvert . . . . . 25.25 „

And supposed height from that level of our hill nearest Chipping Barnet . . 100.00 „

And we make the surface of the ground at the proposed site of well above Trinity datum, say . . . . . 287.75 feet.

The water level in the London basin, as I have before stated, is known to be near the surface; suppose it to be represented by the level to which the water rises in the Trafalgar-square wells, namely, below Trinity datum about . . . . . 52.25 „

(N.B.—The depth is stated by Prestwick to be from 40 to 60 feet.)

And we may venture to assume that, at New Barnet, it is below the surface, approximately . . . . . 340.00 feet.

Add for depth of water . . . . 20.00 „

And we conclude the depth for our shaft should be . . . . . 360.00 feet.

New Barnet being within the area in which the London clay overlays the chalk, I have assumed the water level there to be the same as at London. A few miles northward, where there is a wide outcrop of the chalk, I have no doubt but the water level rises in the higher parts of the outcrop, owing to the obstacles of friction and capillary attraction, which impede the settling of the water to its natural level in the basin; such rise would but tend to increase the hydrostatic pressure in the bore of our well.

I find some difficulty in forming an opinion as to the probable depth to the chalk and to the water at New Barnet, the nearest wells sunk into the chalk that I have any record of being that at the lunatic asylum, Colney Hatch, about 3½ miles distant, and one sunk by Mr. Randall about a mile off, near Chipping Barnet. In the former case, the depth to the chalk was 188 feet; in the latter, it is stated to have been 330 feet; the site is 30 or 40 feet above that of our proposed well. I should suppose, from these data, that to assume the depth to the chalk to be 340 feet would be very safe; this would make the chalk coincident with the water level, as already deduced.

We have now to consider the depth in the chalk at which we should probably meet a sufficiency of the pure soft spring water of that formation. The depth bored to varies considerably. At Bulphan Fen, Essex, it was 35 feet; at Mortlake, 50 feet; Mr. Randall's well, 70 feet; east side of London, 123 feet; Enfield Chase, 100 feet; Colney Hatch, 141 feet; Trafalgar-square, 147 feet; Camden station, 166 feet. The supply of water with the 70-feet bore at Mr. Randall's was small, and I would rather adopt the Colney Hatch depth of 141 feet, or say 160; this will make the depth of our bore 140 feet, and the total depth of the well 500 feet.

In order to arrive at an estimate of the amount of supply to be sought.

Take the portion of the estate to be laid out in building allotments at 150 acres = $2\frac{2}{5}$ square miles.

The maximum population of London is estimated at 243,000 per square mile; take the future population of New Barnet at a little less than a twenty-fourth of this ratio, say 10,000, then $10{,}000 \times 2\frac{2}{5} = 24{,}000$.

Allowing, for every purpose, 20 gallons per head per diem, we have 480,000 gallons wanted per diem.

But this has fairly to be reduced in consideration of the quantity of roof or rain water (the most valuable of all), which would probably be saved, and made available. The fall of rain for London has been estimated at 24 inches per annum. Suppose we take 20 inches; suppose, also, that we divide the population by 5 for families, making of the latter 4800, and that each family has a roof covering of 30 feet by 20 feet = 600 square feet; then, $4800 \times 600 \times 20$ inches = 4,800,000 feet, or 30,000,000 gallons per annum, which $\div 365 =$ about 82,192, or, reduced for waste, say 80,000 per diem; therefore the supply, 480,000 – 80,000, becomes 400,000 gallons per diem.

It would be extraordinary if such a population as 24,000 sprung up at New Barnet for many years to come, notwithstanding its beauty and general eligibility; therefore, though regarding such as its population eventually, which should be provided for, as regards the capabilities of an Artesian well, I would only take 40,000 gallons per diem, or one-tenth of the quantity already computed, into present calculations for lifting, tanking, and delivering the water.

As you may be desirous to know the progress made in this inquiry, and also as I have another proposition to make with respect to the bore, I think it proper to

send you the results obtained up to the present juncture, and to reserve, for a second report, the consideration of the construction of the well and reservoir, and the particulars of the pumps and of the mains for supply, as also the estimates.

I am, &c.,

JAMES WYLSON.

To

IV.—*Report on the Supply of Water to the Barnet Estate. By Joshua Prestwick, Jun., F.R.S., F.G.S.*

20, Mark-lane, June 12, 1855.

SIR,

Agreeably to your request, I have considered the geological structure, and made some further slight examination, of the country around Barnet, with a view to determine the best course of water supply for the property of the National Freehold Land Society, adjoining the Barnet Railway Station. There are four sources of supply which have to be considered. 1st. That from shallow surface springs; 2nd. That from any neighbouring springs; 3rd. That from more distant streams or waterworks; and 4th. That from deep or Artesian wells.

In the first case, the permeable surface beds of sands and gravel are of so limited extent, being confined chiefly to the tops of some of the adjacent hills, that they only suffice for the supply of the population located on those sites, and no other additional supply could be looked for from that source.

In the second place, the streams are small; still, as they drain a clay surface of several square miles in

extent, a not inconsiderable supply of water might probably be obtained by damming up the brook at the lower and most easterly part of the Company's estate at a point a little below where the two brooks meet. Apart, however, from other difficulties, the use of these brooks for drainage purposes might form a sufficient objection to this plan.

The third plan is principally a question of cost in relation to the fourth plan. The New River, passing near the railway at Hornsey, offers facilities for bringing the water to Barnet, but the expense would necessarily be considerable.

The fourth plan is the one to which my attention was more particularly directed, and which I will enter into more detail. Although there is an absence of exact data bearing immediately upon the subject in question, there still is sufficient corroborative evidence to arrive, I think, at a closely approximate conclusion. Unfortunately, also, with the exception of the levels furnished by the Great Northern Railway, there exists but very little information with regard to the height of the hills and elevation of the valleys through the country for some miles around the Company's property. I have therefore had to depend upon the few hasty and rough observations I have been able to make with the aneroid barometer. Such levels must be taken only as approximative, but they are probably sufficiently near to the truth not materially to affect the general results. To determine the thickness of the strata and the depth of the water level on the Company's estate, I have taken two lines of section, one north and south, and the other east and west, and both passing by the Barnet Station, the height of which spot above Trinity high-water mark is, I am informed by Mr. Wylson, 223 feet. This will serve as a datum level in the following calculations.

The first section I commenced at a distance of about four and a half miles to the north, in the valley at South Minns. The ground of these estimated to be about 250 feet above Trinity high-water mark at London. The chalk comes to the surface in that valley, and so continues to North Minns. Along this lime there is a stream with an occasional considerable flow of water, which sometimes lodges and accumulates to a depth of 8 to 12 feet at North Minns, until carried off through the chalk to lower grounds at some distance northward.

At North Minns the water level in the chalk varies considerably, but rarely or never falls below 40 feet from the surface. The supply of water is unfailing. At South Minns a well was sunk at the police station a few years since to a depth of about 70 feet, and the water, which is of good quality, but rather hard, stands almost invariably at a depth of about 50 from the surface. It never fails. But the demand in both these cases is moderate. Between the valley of the Minns, Potter's Bar, and Hadley, the chalk dips to the southward, and is succeeded by 50 to 60 feet of sands and clays, and then by the great mass of the London clay. The chalk must, consequently, reach some considerable depth beneath the surface at Barnet and Hadley. About fifteen years since a well was sunk in some premises occupied by Mr. Quilter, near Hadley Church, at a spot which I estimate to be about 340 to 350 above T. H. W. M.

I am informed by Mr. Clark, who made the well, that the London clay and underlying sands were 300 feet thick, and that below that depth he bored 50 feet into the chalk, where water was met with, which rose to within 260 feet of the surface. I do not know whether or not the supply of water is large. Southward of

Barnet Station, the next deep well we meet with is at the Colney Hatch Asylum, which stands at a height of about 150 feet above T. H. W. M. This well traverses 134 feet of London clay, 27 feet of mottled clays, then 25 feet of sands, and penetrates 141 feet in the chalk, where a good supply of water, rising to within 110 feet of the surface, is obtained. At Hornsey there is a well which traversed 142 feet of London clay, 8 of sands, and 71 of clay and sands, when water was found, and rose to within 70 feet of the surface. The height of the ground may be about 100 feet above T. H. W. M. Now, taking the foregoing data, and having ascertained as near as possible the dip of the strata at North Minns and Potter's Bar to be very slightly to the southward, whilst in the neighbourhood of Barnet the strata are nearly horizontal, and so continue to Colney Hatch and Hornsey, we may form some estimate of the thickness of the London clay and underlying sands at any point on this line of section, provided no faults of any consequence intervene, and which we have no reason to suspect.

The result with regard to the Barnet estate is, that at the level of the railway station the London clay may be from 140 to 150 feet thick, and the clays and sands beneath it 50 to 60 feet thick, making a total depth to the chalk of from 190 to 200 feet.

The second section commences at Edmonton. At a well near this place the clays were found to be about 90 feet thick, and the water, which is obtained from the sand beds, rises to the surface. At Winchmore Hill, at a height of about 150 feet above T. H. W. M., the chalk was reached at a depth of 230 feet, and water obtained, but I could learn no exact particulars. Thence carrying the section by Bohunt Gate, we meet with no deep well until we pass the Barnet Station and reach the foot

of Barnet Hill, where a deep well was sunk several years since at the old workhouse. No exact particulars of the strata passed through, or of the bed from which the water rises, are to be obtained, but the well has been ascertained to be 211 feet deep, and the water to rise 16 feet in the shaft.

This section leads me nearly to the same conclusion as the other respecting the thickness of the London clay at the Barnet Station. It makes it probably a slight degree thicker, but the data are not so good.

We now have to consider the sources from which a supply of water might be obtained. Immediately beneath the London clay is usually a thin seam of sand, but this yields but a very small supply of water. A very irregular mass of mottled clays then follow, varying in thickness from 20 to 40 feet, and beneath this is the main mass of the lower tertiary sands from 10 to 30 feet thick. In these sands a considerable supply of water is obtained at various places in and around London, and it is probable that a supply of water might be obtained from them at Barnet. In case, however, they should not yield a sufficient supply, then the chalk which underlies all these strata, and which outcrops at so short a distance to the north, would, I believe, not fail to furnish a large supply of water, but unlike the sands, which would yield their water as soon as tapped, it is not possible to say exactly to what depth it might be necessary to sink in the chalk before meeting with a spring of the force required. It might be found at a depth of 10 feet in this deposit, or it might be necessary to go to a depth of 100 feet. The latter would, however, be, I believe, an extreme case.

The next consideration is with regard to the height to which the water would rise. Connecting by a slightly inclined line the water levels which we have ascertained

at Minns, Hadley, and Colney Hatch, the depth of the water level beneath the surface, at the level of the Barnet Railway Station, would be about 150 to 160 feet. In making this calculation, I assume the boring to be carried down to the chalk. The water in the overlying sands might stand a few feet higher.

In the foregoing calculations I have placed the well on the level of the railway station, but I think that the most eligible spot for such a work would be by the side of the brook, at the extreme east of the Company's property, in a field where some gravel has been dug for the new roads on the estate. This spot is lower, I should estimate, by about 50 feet than the railway station; consequently the sands might there be reached at a depth from 110 to 120 feet, the chalk at a depth of from 140 to 150 feet, and the water might rise to within 100 to 110 feet of the surface. The cost and time of sinking a well increases so rapidly with the depth that it will, I think, be found less expensive to have the well at this lowest level, and to pump the water to a higher reservoir, rather than to have the well itself on that higher ground. It will also require less power to raise the water, say 100 feet, and then to force it 100 feet higher, than to have to raise it 200 feet by one operation.

I may also further observe, that although it may ultimately be necessary, when a larger number of houses have to be supplied, to have a well of considerable size, and with a large head of water, yet that, on the score of rapidity and economy of execution, I should for the present recommend that merely a boring of from 8 to 10 inches in diameter (which would serve the object of a trial bore) should be made at the spot last mentioned. For provided the flow of water should prove sufficient, and the sands offer no obstruction to working the pump, instead of sinking a shaft to meet the water at a depth

of 120 to 130 feet, it might at present answer the object of the Company to have small pumps let down the bore, which is, I am informed, perfectly practicable, and raise the water by hand or horse power. A small temporary work of this description might be executed, I should conceive, in a very few weeks, and at a very small cost, and would not preclude the execution of larger works on the same spot, if the supply by this means were not found sufficient for present purposes, or should require increasing hereafter. In that case the shaft could be dug, so as to allow these first bore tubes to remain first within it, and could be carried down to the exact depth that this trial bore would have proved necessary the lower part of the original bore, and then be opened into the shaft, and thus made available in this more permanent and large work. In the mean time, the permanent tubes for carrying water to the higher part of the estates could be laid down as far as might be considered necessary for the present.

With regard to the quality of the water, that from the sands is usually soft, but contains a large proportion of grains of solid matter to the gallon than the water from the chalk. The water from the latter is almost always bright and good, but hard. This, however, readily admits of the application of Clark's softening process.

In conclusion, I beg to state that although an inquiry of this description is attended with some uncertainty as to exact results, still I believe that the measures here given will be found to approximate closely to the truth, and that a good supply of water may be obtained without much difficulty, and at a moderate expense, at the spot, and by the means indicated.

I remain, sir,

(Signed) J. Prestwick, Jun., F.R.S.

Charles Gilpin, Esq.

V.—*Proposed new Bridge at over the River .*

November, 1864.

Dear Sir,

In accordance with your wish expressed on the 29th ult., that I should present a report on the proposed bridge over the at , I beg to state as follows:

First. I have very carefully considered how the best and cheapest approaches to the town could be made, and I feel assured, without such approaches, the estate must remain quite isolated and at times unapproachable, and from these facts, whether you allot it in large areas for good houses, or in small pieces for inferior buildings, its value must remain low, for, without the communications, it could scarcely be called "improved property," notwithstanding all that can be done on the estate itself in the shape of road making, or other works.

The neighbourhood is now much visited by gentlemen from a distance, and various questions have been asked the servants on the estate as to its destination and the meaning of the works, and how it may probably be allotted; this, to say the least of it, shows some interest is taken in the property, and, of the purchasers of the Godalming estate, I believe the far greater number would be from a distance. I feel equally assured that a good approach to the estate from the station, passable in all seasons without inconvenience, would be one of the things first looked at, and a matter that would be gravely considered before any offer to purchase would be made. I have thus briefly endeavoured to bring to your mind the matters you have often referred to; they all tend to one view of the case, the necessity of an

TIMBER BRIDGE AT G.

SCALE OF FEET.

Inches 12 0 1 2 3 4 5 10 15 20 25 Feet

Newbery & Alexander, Lith.
43, Castle Street, Holborn.

E. & F. N. Spon 16 Bucklersbury, London.

approach to the estate for carriages and traffic, and this approach involves the construction of a bridge.

Second. *As to the construction of the bridge, the reasons for adopting this method, and the cost*, I propose that the structure should be formed of timber, the portions of which exposed to moisture should be well creosoted, the whole securely framed, and without any intervening supports in the river itself, thus leaving a clear water way of the full uncontracted width of the river. I propose that the girders should rest on piles, as shown in the drawing, driven by means of an ordinary crab engine to a proper and secure depth in the soil. The rows of piles at each end are double, as I get by this means, after the openings are planked and filled with earth, secure abutments. I have designed the bridge of the width of 21 feet between the parapet railing, leaving a carriage way with a sufficient footway on one side; I am aware that a structure of brick and stone, or brick and iron, would be more enduring, but any of them would be much more costly, in this case especially, as the ground is not suited for foundations for heavy structures, and the railway, where it crosses the valley and the river, is constructed on timber viaducts. I propose that the footway and roadway of the bridge should be formed first by planking, and then by covering with asphalte made by boiling lime, coal tar, and ballast in proper proportions on the spot, spreading it on whilst hot in two separate layers. A most durable roadway would thus be formed, as well as one perfectly impervious to water, thus tending materially to preserve the timbers of the bridge. The suspension bridge erected by Mr. Telford over the Conway, at Conway, over which there is a great deal of traffic, is covered by a composition of this kind, and, although it has been in wear more than thirty years, has never been replaced,

and only repaired in some few places. As to the durability of timber, it decays only from one cause, the putrefaction of the sap or alburnum in the pores, and if this tendency to decay could be effectually arrested, timber exposed to moisture would be as durable as the best brick or stone, and more so than iron. Various methods have been resorted to for preserving timber, such as "Kyans" by means of a solution of corrosive sublimate, and "Paynes" by impregnation with sulphate of iron, and afterwards muriate of lime, by steam pressure, and Bethell's creosoting process; for cheapness, durability, and convenience the latter is greatly to be preferred, and is now generally adopted. The sap and water is first dried out of the timber, and the creosote, when the timber is dried, is forced in by steam pressure. If the operation be properly performed, twenty or thirty years' wear, under circumstances like the present, will not injure the timber in the least, so that it may be considered durable.

I propose only to creosote such portions of the timbers of the bridge as will be exposed to dampness and moisture, and such as have no transverse strain to bear, for two reasons: the operation of creosoting increases the weight of the timber from 7 to 10 lbs. per cubic foot, and, from experiments that we made in Wales, it reduces the transverse strength about 4 per cent. I propose to cover the timber above water with anti-corrosive paint.

Third. As to the cost of the bridge, I find it will require about 3200 cubic feet of red pine timber, called Baltic, which may be taken at 4s. per foot, including labour and ironwork. The cost of the structure would not exceed 640*l*., including painting and the asphalte complete—a small sum as compared with similar structures executed in more expensive materials. Putting

the estate at 130 acres, which is about the quantity, the cost per acre would be slightly in excess of 5*l.*, which is not a large sum when the importance of the improvement is considered.

I have the honour to be, sir,
Your most obedient servant,
JOHN BLENKARN.

W. Austin, Esq.

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